THE ROLE OF SELF-REINFORCING MECHANISMS IN ORGANIZATIONAL ADAPTATION: EVIDENCE FROM GERMAN UTILITIES

DISSERTATION

submitted by

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AUTHOR'S DECLARATION

The author hereby declares that this dissertation is entirely his own work. All sources used in this dissertation are fully acknowledged and all quotations are properly identified. The author understands the ethical implications of his research. This work fully complies with the requirements of De Montfort University for the degree of Doctor of Philosophy. The author declares that the work presented in this dissertation was solely conducted during registration for the abovementioned award with De Montfort University and under University supervision.

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ABSTRACT

This dissertation enhances existing understanding of the role of self-reinforcing mechanisms as driving forces of organizational path dependence and thus limiting factors for organizational adaptation. In this way, the dissertation sheds light on the underlying dynamics of scale, complementary, learning, coordination, and expectation effects that keep organizations on a once entered development path.

To investigate the specific development of six German utility companies between the liberalization of the German energy market in 1999, and 2015, this dissertation applies a multiple-case study approach to empirically uncover the self-reinforcing mechanisms' modes of action in replicating existing activity patterns and thus shaping firms' development paths.

Thereby, this dissertation contributes to the understanding of self-reinforcing mechanisms in three respects. First, it advances understanding of the underlying dynamics of self-reinforcing mechanisms by adding new dimensions to conceptions of learning, coordination, and expectation effects and providing in-depth explanations for their stabilizing effects. Second, this dissertation enhances a differentiated view on self-reinforcing mechanisms while offering empirical evidence that these effects not only have a limiting influence but might also facilitate organizational adaptation in certain contextual settings. Third, this dissertation contributes to an understanding of the role of managerial agency while empirically substantiating that agency matters, even in a state of path dependence.

Accordingly, this dissertation proposes a reconceptualization of the classic theory of organizational path dependence in a less deterministic manner, placing greater emphasis on the role and influence of corporate actors in breaking existing paths. Indeed, this dissertation strongly suggests that the driving forces of path dependence should be understood as temporal influencing factors on firms' strategic initiatives that appear to have either a widening or a limiting effect on the scope of alternatives, and which can consciously be overcome.

Besides its contributions to theory, this dissertation provides concrete practical guidance for managers to increase their awareness and to counteract those stabilizing influencing factors in the context of strategic decision making.

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LIST OF ABBREVIATIONS

C-level…….. Chief-level

CEO …….. Chief executive officer

CFO……... Chief financial officer

CO2 ……...Carbon dioxide

COO……...Chief operating officer

DNA……...Deoxyribonucleic acid

E.g. ……*Exempli gratia*; Latin for “for example”

Et al. ……..*Et alii*; Latin for “and others”

EU ETS …….European Union Emissions Trading System

FNA …….. Federal Network Agency

I.e. ……*Id est*; Latin for “that is to say”

IRR…… Internal rate of return

M&A……. Mergers and acquisitions

MNE…….. Multinational enterprise

P. ……...Page

ROI…… Return on investment

RQ …….Research question

1. INTRODUCTION

The greatest danger in times of turbulence is not the turbulence – it is to act with yesterday's logic.

Peter Drucker

1.1. INTRODUCTION TO THE TOPIC

Today's business environments in almost every industry are characterized by a high level of dynamism and uncertainty. This issue particularly manifests itself in frequent disruption and hypercompetition, that is, competitive pressure from new market entrants and shortening product or business model life cycles (D'Aveni 1995; Teece and Leih 2016). Major drivers of this development include changing consumer behaviors, technological innovations, and shifting requirements due to legal and political events (Barreto 2010; Teece et al. 2016). In such environmental settings, one can observe formerly successful firms failing to realign their strategies to new circumstances, ultimately finding themselves traveling down a dead-end road.

One prominent example illustrating this development is Nokia. The Finnish company was able to constantly reinvent itself for a period of over 140 years. Indeed, having been founded as a paper mill operator in 1865, Nokia evolved into a producer of paper products, rubber boots, and tires, before becoming one of the world's leading cell phone producers with a worldwide market share of over 50 per cent in 2007. On its journey to become number one in the cell phone business, the company divested all businesses other than telecommunications in order to strengthen its core (Harreld et al. 2006). However,

with the smartphone revolution pioneered by Apple in 2007, an entirely new market segment was created besides classic cell phones (Teece et al. 2016). Nurtured by further technological developments and changing consumer preferences toward smartphones, this new market segment constantly gained market share and eroded the established cell phone market. Nevertheless, Nokia continued focusing on the cell phone segment despite the continuous decreasing relevance and demand of this market segment. By the time Nokia had recognized the growing importance of the smartphone business, it was too late to realign its strategy, as the company had already been overtaken by competitors like Apple, Google, and Microsoft. To date, Nokia finds itself in a complicated situation that is characterized by scarce financial resources and a limited range of potential strategic alternatives.

Apple represents another example, as the company passed through a similar development, although it did not reach the dead end yet. Since the return of its former CEO Steve Jobs in 1997, Apple launched a series of groundbreaking innovations. Beginning with the iPod (2001) and the music store iTunes (2003), Apple revolutionized music consumption. In 2007, the company launched the iPhone and thereby created an entire new market segment within the cell phone market. Just three years later, Apple launched yet another breakthrough innovation. While inventing the iPad, the company created a new market for tablet computers. However, for several years after Jobs' passing, Apple did not generate any further groundbreaking innovations, instead focusing on incremental improvements of its existing product range. Thus, the company adheres to its once entered strategy. While its competitors continuously gain market shares, Apple faces a decline in

sales of its products and, as the market still expects it to produce the next big thing, the company's share price is continuously decreasing.

These examples revive the old debate about organizations naturally drifting toward efficiency (Fainshmidt and Frazier 2017) and thus being inherently prone to tendencies of persistence within their processes of strategic change. Leading scholars in the field of organizational realignment state that organizations are generally unable *"to change their familiar ways of doing when confronted with new developments"* (Schreyoegg and Kliesch-Eberl 2007, p. 916). Stemming from different theoretical directions, the existing literature addresses five antecedents of organizational persistence.

First, the literature on resource commitment stresses the binding effects of a company's investments through increasing subsequent exit barriers, resulting in the persistence of organizational strategies (Ghemawat 1991). Although conceived as a prerequisite for competitive advantage by building heterogeneity and superior performance, firm-specific investments increasingly become irreversible and rigid (Ghemawat 1991). This downside is a result of the rising cost of separating and abandoning sticky resources, similar to the argumentation of sunk costs (Ghemawat 1991).

Second, research on escalating commitment draws on the phenomenon of throwing good money after bad (Guler 2007) as an outcome of self-justification processes and fear of losing face (Staw 1976; Brockner 1992; Ross and Staw 1993). Despite experiencing negative feedback, escalating commitment prevents organizational decision makers from admitting and reversing bad prior decisions of resource allocation (Staw 1976; Brockner 1992; Ross and Staw 1993). Conversely and driven by an urge to save face, decision

makers support insufficient decisions of resource allocation in order to reaffirm their usefulness (Brockner 1992).

Third, population ecology research considers structural inertia a prerequisite for organizational success while facilitating an organization's reliability and identification as a decisive unit (Hannan and Freeman 1984; Huff et al. 1992). However, in changing environments, organizations are tied to these stabilized organizational structures and activity patterns (Hannan and Freeman 1984; Markides 1998). A tendency to resist departing from proven structural schemes becomes manifested in structural resistance to fundamental reorganization (Schwarz 2010). Consequently, the risk of maladaptation increases (Hannan and Freeman 1984). Paradoxically, overcoming structural inertia has been deemed key to survival (Schreyoegg and Kliesch-Eberl 2007).

Fourth, the concept of imprinting stresses the power of initial cognitive schemes, competencies, and contextual conditions at the time of founding that imprint organizational processes in the future (Stinchcombe 1965; Johnson 2007). As a result, reproduced activity patterns persist and continue to influence future activities (Stinchcombe 1965; Johnson 2007). Institutionalization processes are considered key drivers for imprinting (Johnson 2007). Even where the requirement for change is recognized, imprinted activity patterns lead decision makers to trace alternatives only in the surroundings of the imprinted processes (Johnson and Johnson 2002).

Fifth, self-reinforcing mechanisms have been identified as the key drivers behind organizational path dependence (Sydow et al. 2009; Apajalahti and Lovio 2012; Schreyoegg and Sydow 2012). This body of literature argues that self-reinforcing

mechanisms lie *"at the core of the theory of path dependence"* (Schreyoegg et al. 2011, p. 96) as they initiate a process leading to a narrowing scope of alternative actions available to the organization, which eventually results in a state of persistence, or at least limited choice (Koch 2011; Schreyoegg et al. 2011). Thereby, once successful activities generate positive feedback loops while initiating dynamics of increasing returns (David 1985; Arthur 1989, 1990). Consequently, such influential factors lead to a replication of activity patterns that *"become fixed to the constellations in which they proved to be successful"* (Schreyoegg and Kliesch-Eberl 2007, p. 916).

Although these drivers of persistence share in common the fact that they all lead to rigid activity patterns of the organization based on the consequences of former activities, they significantly differ in their explanations concerning how organizations become resistant to change. The theoretical concepts of resource commitment and sunk cost (Ghemawat 1991) and escalating commitment (Staw 1976; Brockner 1992) both focus on economic factors in explaining organizational persistence. Structural inertia (Hannan and Freeman 1984; Schwarz 2010) blames organizational effects for inducing tendencies of persistence in organizations. Finally, the concept of imprinting (Stinchcombe 1965; Johnson 2007) argues that social effects are the critical drivers of persistence. Thereby, the abovementioned concepts only focus on a single perspective to explain the phenomenon of organizational persistence.

By contrast, the concept of self-reinforcing mechanisms, which is rooted in the theory of organizational path dependence, combines all three perspectives in order to explain an organization's tendency to persist, i.e., economic, organizational, and social effects (Sydow et al. 2009). Based on this multi-perspective view, the concept of self-reinforcing

mechanisms seems to provide the most comprehensive and thus most promising explanations for organizational persistence (Schreyoegg et al. 2011).

However, after 20 years of research since Sydow et al.'s (2009) seminal work on organizational path dependence, and despite an accumulation of case studies on path dependence (Vergne 2013), a clear understanding of the workings of the self-reinforcing mechanisms underlying the constitution of organizational path dependence is still missing (Sydow et al. 2009; Schreyoegg et al. 2011; Vergne and Durand 2010; Vergne 2013). So far, *"organization and management scholars have done a poor job at exploring path dependence* [and its driving forces of self-reinforcing mechanisms] *empirically"* (Vergne 2013, p. 1194), resulting in *"a significant portion of the scholarly community still do not buy the path dependence story"* (Vergne 2013, p. 1192).

For this reason, this dissertation follows a strong call from the field of path dependence research to shed light on the modes of action of self-reinforcing mechanisms at the core of organizational path dependence (Sydow et al. 2009). The aim of this study is to advance research on path dependence while unpacking self-reinforcing mechanisms in practice (Sydow et al. 2009; Schreyoegg et al. 2011) and explaining which components of these driving dynamics are at play in keeping organizations on an once entered development path while continuously impeding organizational adaptation (Vergne and Durand 2010). Consequently, the guiding research question of this dissertation is:

RQ: How do self-reinforcing mechanisms impede organizational adaptation?

1.2. PHILOSOPHY OF SCIENCE

This chapter provides an overview of the underlying philosophical assumptions of this dissertation in terms of ontology (i.e., the nature of the world), epistemology (i.e., how the world is perceived and how knowledge is generated and transferred), human nature (i.e., the relationship between human beings and their environment), and methodology (i.e., concepts, measures, and underlying themes) as a consequence of the aforementioned dimensions (Burrell and Morgan 1979). According to Burrell and Morgan (1979), these four philosophical assumptions can be divided into two broad and polarized perspectives – the subjectivist approach versus the objectivist approach to social sciences – as outlined in Figure 1.

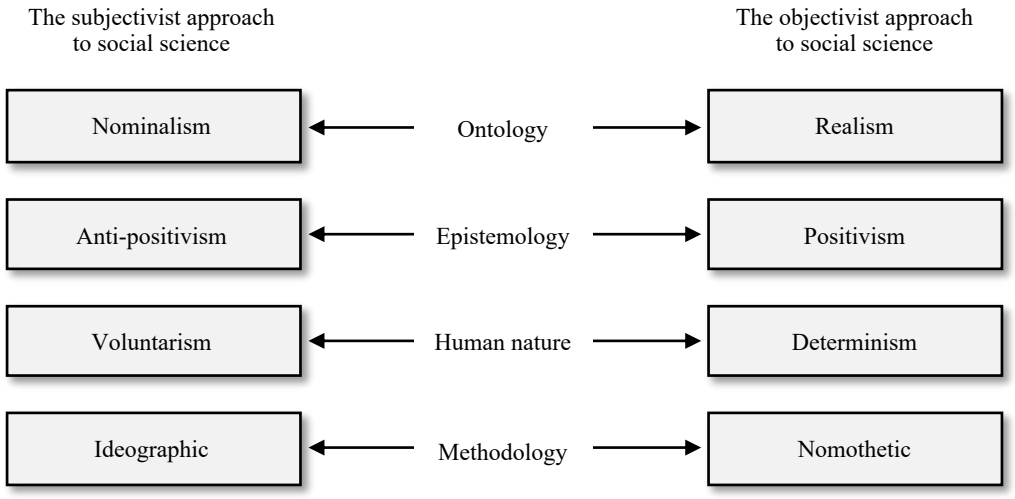

Figure 1: A Scheme for Analyzing Assumptions about the Nature of Science (Burrell and Morgan 1979, p. 3)

First, in terms of ontology, the subjectivist perspective assumes that *reality* is the product of one's individual cognition (nominalism), while the objectivist approach views it as having an objective nature, given in the world (Kolakowski 1972; Keat and Urry 1975; Burrell and Morgan 1979). The latter assumption refers to the realism perspective (Keat and Urry 1975). Second, with respect to epistemology, the subjectivist approach assumes that *knowledge* is soft, subjective, and spiritual (anti-positivism), whereas the objectivist approach defines it as hard, real, and capable of being transmitted in tangible forms (positivism) (Douglas 1970; Giddens 1974; Burrell and Morgan 1979). Third, the two ends of the continuum concern assumptions about *human nature* by distinguishing voluntarism (subjective approach) from determinism (objectivist approach). Whereas the former conceptualizes humans as creators of their environments, the latter understands humans as being conditioned by their environments and thus products of them (Burrell and Morgan 1979). Fourth, the *methodological dimension* distinguishes the ideographic (subjective approach) from the nomothetic dimension (objectivist approach). In extreme cases, the ideographic dimension focuses on *"what is unique and particular to the individual rather than of what is general and universal"* (Burrell and Morgan 1979, p. 3). Thus, the subjectivist approach generally applies qualitative methods, while the objectivist approach typically uses quantitative reasoning (Blumer 1969; Burrell and Morgan 1979).

On the basis of the analytic framework established by Burrell and Morgan (1979) with its four constituting perspectives, this dissertation gravitates toward the objectivist approach to social sciences. With respect to the ontological dimension, this dissertation applies the assumption of a social world being constituted of hard, tangible and measurable structures

that exist as empirical entities: A perspective of realism (Kolakowski 1972; Keat and Urry 1975; Burrell and Morgan 1979). Furthermore this dissertation refers to a positivist epistemology that *"seek*[s] *to explain and predict what happens in the social world by searching for regularities and causal relationships between its constituent elements"* (Burrell and Morgan 1979, p. 5). Thereby, the positivist perspective allows individuals' activities to be observed from the outside in order to generate knowledge (Douglas 1970; Giddens 1974).

While the two perspectives of human nature proposed by Burrell and Morgan (1979) – voluntarism (i.e., completely autonomous and free-willed) and determinism (i.e., completely determined by the environment) – represent two extreme ends of a continuum, this dissertation adopts a rather immediate standpoint with respect to the conception of human nature. Thus, it is argued that the influence of situational and voluntary factors shape the behavior and activities of actors in organizations (Burrell and Morgan 1979). This perspective of human nature is congruent with the conception proposed by Emirbayer and Mische (1998, p. 1012), highlighting the *"reconstructive, (self-) transformative potentialities of human agency, when faced with contradictory or otherwise problematic situations."* That is, human beings are able to change their behavior even within constrained contextual situations (Emirbayer and Mische 1998), or put differently, human agency is not determined by the environment, although human behavior is influenced by it. While this immediate perspective on human nature contradicts the initial and rather deterministic understanding of the phenomenon of path dependence presented by David (1985), Arthur (1990, 1989) and Sydow et al. (2009), it

follows the conception of Garud and Karnøe (2001) and Djelic and Quack (2007) by arguing that agency matters in the concept of path dependence.

With respect to the methodological dimension, this dissertation advocates a subjectivist approach to social science. Thus, this research takes an ideographic perspective by applying qualitative methods (Burrell and Morgan 1979) to shed light on a phenomenon with less empirical substantiation. Stated more philosophically, the purpose of the qualitative approach is to gain an understanding of reality (Gephart 2004). Following Gephart (2004, p. 455):

> *Qualitative research can provide thick, detailed descriptions of actual actions in real-life contexts that recover and preserve the actual meanings that actors ascribe to these actions and settings. Qualitative research can thus provide bases for understanding social processes that underlie management.*

Therefore, even though qualitative methodologies' insights are less generalizable than quantitative reasoning, they are more powerful, substantial and relevant (Miles and Huberman 1994; Yin 2009). In this research, the data collected are used to explore the phenomenon of self-reinforcing mechanisms in practice, to identify themes and patterns, and to contribute to the advancement of the theory of path dependence. Thus, this research applies an interpretive and inductive approach to theory development (Van Maanen 1998; Gephart 2004).

1.3. STRUCTURE AND LINE OF ARGUMENTATION

Figure 2 outlines the structure of this dissertation and the anchoring of the corresponding research question. Chapter one – the introduction – presents the context of this research, outlines the research gap, and formulates the guiding research question (RQ). Furthermore, the underlying philosophical assumptions of science are explained in this chapter.

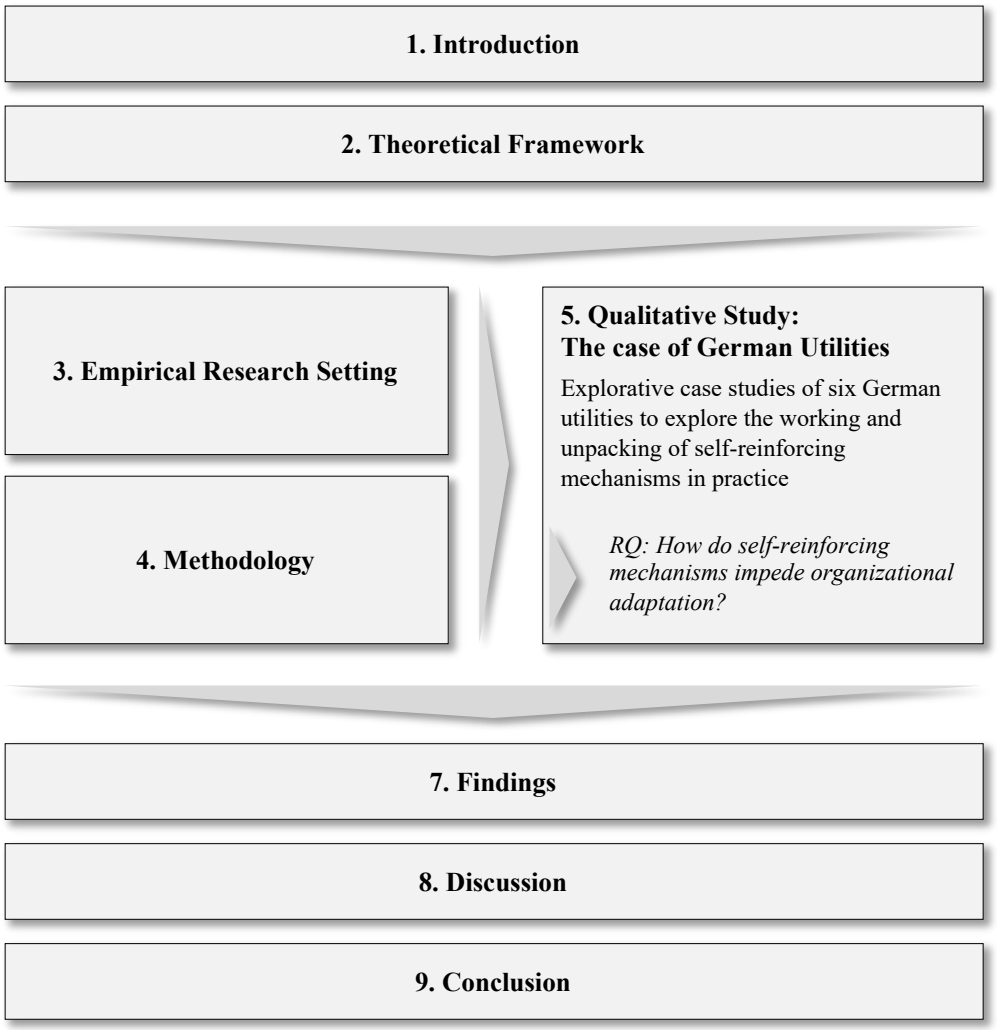

Figure 2: Structure of the Dissertation

Chapter two highlights the theoretical framework of this work by introducing the theory of organizational path dependence, outlining the latest research in the field, and explaining the concept of self-reinforcing mechanisms as the driving forces that shape organizational paths.

In chapter three, the development of the German utility market as the empirical research setting of this dissertation is described, facilitating a detailed understanding of the market dynamics and the particular contexts in which the actions of the focal firms – the six German utility companies – took place.

Chapter four discusses the methodology applied in this dissertation. As this research is based on qualitative reasoning, and in particular on an explorative, longitudinal multiple-case study approach, the first subchapter outlines the case selection method and highlights the reasons for choosing the specific focal firms. The second subchapter then explains how the data were collected, and the third subchapter illustrates the process of data coding and analysis.

Chapter five represents the heart of this dissertation. Divided into three groups, the specific development of and the reasons behind the particular courses of action taken by the focal firms are illustrated. Thereby, the modes of action of self-reinforcing mechanisms in practice are demonstrated in different organizational and contextual settings in order to explore how these processes unfold and impede organizational adaptation. The findings of the qualitative study are then outlined in chapter six.

Chapter seven discusses the findings of this dissertation and elucidates its theoretical implications and contributions to the theory of organizational path dependence. Chapter

seven also highlights the implications for managerial practice and the limitations of this work. The dissertation concludes by indicating promising directions for future research in chapter eight.

2. THEORETICAL FRAMEWORK

He who loves practice without theory is like the sailor who boards ship without a rudder and compass and never knows where he may cast.

Leonardo da Vinci

2.1. ORGANIZATIONAL PATH DEPENDENCE

Research on path dependence is rooted in the years 1985 to 1990 with the seminal works of David (1985) and Arthur (1989, 1990). While undertaking an industry perspective, the focus of their research was on the development of certain technologies, such as the QWERTY keyboard. Since then, the concept of path dependence saw the accumulation of considerable research focusing on certain so-called path-dependent trajectories (Vergne 2013). Path dependence became a frequently applied notion in strategy literature. Nevertheless, the term was mostly used as a metaphor stressing the importance of a firm's history (Schreyoegg et al. 2011), i.e., an organization's current and future trajectory is shaped or influenced by past decisions and underlying activity patterns (David 1985; Arthur 1989, 1990). Excessive use saw the term's effectiveness become exhausted, leading to many scholars refusing to accept the path dependence story today (Vergne 2013).

Study	Type of Study	Data Source	Sample	Proposals or Findings
Sydow et al. (2009)	Conceptual	–	–	• Theoretical framework to explain how organizations become path dependent • Conceptualization of the emergent process of path dependence along three distinct stages: (1) Preformation phase; (2) formation phase that is driven by self-reinforcing mechanisms; and (3) lock-in phase • Conceptualizing four self-reinforcing mechanisms at the heart of organizational path dependence: (1) Complementary effects; (2) learning effects; (3) coordination effects; and (4) adaptive expectation effects • Scope for an organization to unlock path dependence is limited
Gruber (2010)	Empirical (quantitative)	Survey	446 entrepreneurs of newly founded firms	• Many agents do not consider alternatives for product-market path creation prior to embarking on a specific path • Generation and evaluation of alternatives only plays a minor role in the early stages of path creation: Most firms follow the first path they detect • Existence of alternative paths is unknown at the time decisions on path creation are made: Entering a specific path of development is non-deliberate in the early stages • Core individual-level human capital and financial capital endowments have an influence on the entered development path
Garud et al. (2010)	Conceptual	–	–	• Conversely to Vergne & Durand's (2010) perspective on path dependence (in which actors become locked-in by self-reinforcing mechanisms into paths whose evolution is determined by contingencies and once locked-in, actors cannot break out unless exogenous shocks), the authors propose an alternative concept labeled as path creation, in which agency is understood as being distributed and emergent through relational processes that constitute a path • Path creation perspective differs from the path dependence perspective in four major points: (1) Initial conditions are not given, but flexibly defined and constructed through negtiations by actors; (2) contigencies (chance events) are emergent contexts for action, i.e., non-purposive and somewhat random events; (3) self-reinforcing mechanisms strategically manipulated; and (4) lock-in is a temporary stabilization of paths in-the-making
Vergne and Durand (2010)	Conceptual	–	–	• Path dependence as a property of a stochastic process which obtains under two coditions – contingency and self-reinforcement – and causes lock-in in the absence of exogenous shock • Contingency describe unpredictable, non-purposive, and seemingly random events • Self-reinforcing mechanisms are required to sustain a path through continuously decreasing the relative attractiveness of alternatives: Alternative paths are selected out as the given path becomes more and more dominant over time relative to alternative paths • Lock-in as a situtation of relatively stable equilibrium, caused by path dependence, from which it is difficult to escape without the intervention of shocks exogenous to the system

Table 1: Summary of Selected Research on Organizational Path Dependence

Study	Type of Study	Data Source	Sample	Proposals or Findings
Koch (2011)	Empirical (qualitative)	Semi-structured interviews	2 newspaper publishers	• Definition of a strategic path as a specific strategic pattern developed over time; constituted by self-reinforcing mechanisms; and originally triggered by big events (critical juncture) leading to a lack of strategic choice (p.341) • Range of variety is in general restricted by the developed strategic path of an organization • Differences in the ranges of variety are based on different organizational contexts in which path-dependent strategic patterns emerge (and less based on different self-reinforcing mechanisms itself)
Schreyoegg et al. (2011)	Empirical (qualitative)	Semi-structured interviews and archival data	Book club division of German publisher Bertelsmann	• Empirically tested framework to explain how organizations become path dependent: Illustration of the process of the emergence of an organizational path, beginning with triggering events, strengthened by self-reinforcing mechanisms, and finally leading into a lock-in that seemed impossible to break • Identification of triggering events that induce the emergece of a development path of an organization • Identification of self-reinforcing mechanisms in the form of scale and complementary effects that strengthened the development path of an organization (while other self-reinforcing mechanisms, i.e., learning, coordination, and expectation effects, were identified to play a less important role)
Vergne and Durand (2011)	Conceptual	–	–	• Path dependence is less about how actual paths are chosen, but more about how alternative paths get selected out (p.371) • Consequences of path dependence vary depending on the path selection criteria that are embedded in the internal and external environment of organization • While assuming that path dependence is at work at the organizational level and has been identified, organizations can rely on higher-level dynamic capabilities to break path dependence: Careful managers can decide to develop an ability to change certain routines – internally or with the help of external experts (p.377) • Path dependence as a property that can (but not need to) characterize dynamic capabilities • Some scholars like Teece (2007) overemphasize the managerial ability to reconfigure organizational paths: Dynamic capabilities have a true substance that is distinct from managerial action (p.376)

Table 1: Summary of Selected Research on Organizational Path Dependence *(continued)*

Study	Type of Study	Data Source	Sample	Proposals or Findings
Apajalahti and Lovio (2012)	Empirical (qualitative)	Archival data	Helsingin Energia (largest municipally-owned heat and electricity producer in Finland)	• Conceptual framework explaining path break-out that is based on the theory of Sydow et al. (2009) and the phase-model of destabilization developed by Turnheim & Geels (2012) • Early decisions (triggering events) that initiate the path formation phase might well be strategical and deliberate and not necessarily random • Identification of self-reinforcing mechanisms in the form of scale, complementary, learning, and coordination effects that strengthened the development path of an organization • Path-breaking requires external impulse or pressure; path-breaking behavior cannot be initiated by the same actors who lost their power within the a path-dependent development • Destabilization of self-reinforcing mechanisms follows (1) a mis-match of the organization's internal processes and an increasing external pressure and (2) the organization's unability to adapt to this pressure by following its dominant logic
Schreyoegg and Sydow (2012)	Conceptual	–	–	• Proposing six self-reinforcing mechanisms based on the logic of feedback spirals: (1) Scale effects (economies of scale), (2) complementary effects, (3) learning effects, (4) coordination effects, (5) adaptive expectations, and (6) direct and indirect network externalities • In certain contextual settings self-reinforcing mechanisms are more likely to occur: Environments characterized by ambiguity and complexity facilitate the development of self-reinforcing mechanisms (in accordance with Pierson 2000) (p.19) • Limited power of agency: Social patterns (such as self-reinforcing mechanisms) are likely to develop behind the back of individual and collective actors (p.25)
Sydow et al. (2012)	Empirical (qualitative)	Semi-structured interviews and archival data	Semiconductor manufacturing industry	• Technological paths are not necessarily an emergent phenomenon, i.e., the results of social processes that are beyond the control of agents • Strategic agency (collective agency) involved in extending and creating (technological) paths by purposefully influencing self-reinforcing processes: Organizational agents intentionally seek to benefit from self-reinforcing processes (e.g. learning or complementary effects), although they do not always have an explicit and complete understanding or are in total control of the processes of path constitution • Differentiation between lock-in situations that are deliberately sustained (e.g. in the case of technology development) and those that persist despite strong resistance and dviance on the actors' part

Table 1: Summary of Selected Research on Organizational Path Dependence *(continued)*

In 2009, the seminal work of Sydow and colleagues raised research on path dependence to a new level. While introducing the concept of organizational path dependence, Sydow et al. (2009) theorized that the concept is more than just a metaphorical phrase indicating that history matters, but represents a central driver of organizational persistence. Table 1 presents a summary of selected research on organizational path dependence that is based on or refers to Sydow et al. (2009).

In this way, the essence of organizational path dependence is rooted in an organizational developmental process driven by emerging dynamics that lead to an increasingly narrowed scope of alternatives. Hence, organizations' development might result in a state of persistence or at least limited choice (Koch 2011; Apajalahti and Lovio 2012), in which organizational adaptation is absent.

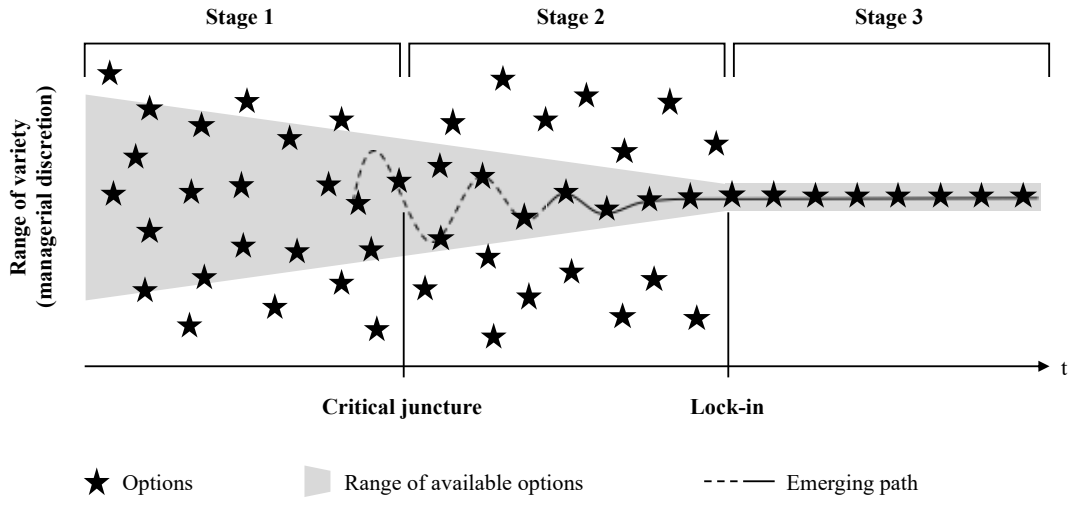

Figure 3: Constitution of Organizational Paths (Sydow et al. 2009, p. 692)

As Figure 4 indicates, an organizational path is understood as comprising three stages (Sydow et al. 2009; Schreyoegg and Sydow 2012). Beginning with a small and contingent event in stage one, self-reinforcing mechanisms come into motion at a critical juncture (stage two), and increasingly assume control of the developmental process. From this point in time, the firm finds itself in a state of path dependence.

This second stage represents the focus of this dissertation. At this point, self-reinforcing dynamics progressively narrow the variation and range of managerial discretion and may ultimately lead to a state of lock-in – conceptualized as a corridor of significantly limited scope of feasible options and hence a state of organizational persistence – in phase three (Arthur 1990; Koch 2011). Self-reinforcing mechanisms have been identified as more or less subtle driving forces on the road to persistence, or put differently, as key drivers of path dependence (Sydow et al. 2009; Apajalahti and Lovio 2012; Schreyoegg and Sydow 2012).

2.2. SELF-REINFORCING MECHANISMS

Self-reinforcing mechanisms are said to lie *"at the core of the theory of path dependence"* (Schreyoegg et al. 2011, p. 96). They emerge due to the prevalence of positive (amplifying) feedback (Schreyoegg and Sydow 2012), induced by increasing returns on a small and contingent initial action (Arthur 1989, 1990). Thus, self-reinforcing mechanisms *"drastically reduce the range of available options"* (Koch 2011, p. 338).

Although self-reinforcing mechanisms involve managerial agency at the very beginning, they increasingly work behind the back of individual agents (Giddens 1984; Schreyoegg

and Sydow 2012). That is, unintended dynamics of the system increasingly and unnoticeably gain control (Schreyoegg and Sydow 2012) while stabilizing and automatizing the collective activity patterns of the organization (Sydow et al. 2009). Hence, self-reinforcing mechanisms are twofold in their nature. In the first instance, the stabilization effect of self-reinforcing mechanisms is beneficial to the organization as it facilitates profitability (Apajalahti and Lovio 2012) and operating efficiency (Levinthal and March 1993; Gilbert 2005). Thus, in this state, self-reinforcing mechanisms are quite favorable.

However, this is true only until a certain point of development. Thereafter and under certain environmental conditions, these dynamics may reverse (Schreyoegg et al. 2011; Schreyoegg and Sydow 2012), with self-reinforcing dynamics leading to negative outcomes in terms of diminished profitability and operating profits as strategic options are either not noticed or are intentionally excluded. The key issue of this double-edged nature of self-reinforcing mechanisms is that the tipping point from positive to negative characteristics is difficult to reverse, even if it is recognized by management. The literature on organizational path dependence argues that this owes to unintended dynamics unconsciously controlling and stabilizing organizational processes, that is, self-reinforcing mechanisms (Schreyoegg et al. 2011; Schreyoegg and Sydow 2012).

At the organizational level, five self-reinforcing mechanisms have been found to establish organizational paths: Scale, complementary, learning, coordination, and expectation effects (Sydow et al. 2009; Schreyoegg et al. 2011; Apajalahti and Lovio 2012; Schreyoegg and Sydow 2012).

Scale effects. Scale effects refer both to economies of scale and economies of scope. By definition, economies of scale are achieved where small proportional increases in the levels of all input factors lead to over-proportional increases in the levels of outputs (Panzar and Willig 1977; Rumelt 1982). Thus, economies of scale describe cost reductions due to larger size and, for example, larger volumes of production. Economies of scope are achieved *"whenever the costs of providing the services of the sharable input to two or more product lines are sub-additive,"* meaning that costs are *"less than the total costs of providing these services for each product line separately"* (Panzar and Willig 1981, p. 268). As a result, scale effects lead to greater profitability as the cost per unit decreases. Thus, the company receives positive feedback in the form of efficiency gains from doing more of the same. On the other hand, strategic alternatives that might be more favorable in the long term will not be perceived or will be overlooked due to lower short-term and concrete profit streams.

Complementary effects. Complementary effects are based on synergies through the connection and interaction of two or more separate sub-systems that produce an additional surplus: $K(x+y) > K(x) + K(y)$ (Prahalad and Hamel 1990). The interaction of complementary sub-systems may lead to the development of growth opportunities in adjacent and interrelated areas and thereby increase profitability based on the potential for synergies (Schreyoegg et al. 2011). In this context, the interconnection of the sub-systems is based on shared resources, such as in terms of skills and competencies or a jointly used customer base. In order to capitalize on such synergy potentials, the interactions between the sub-systems must be continuously deepened and amplified, resulting in an ever-growing level of interdependency. Consequently, activity patterns

increasingly become stabilized, potentially leading to suboptimal resource configurations in case one sub-system suffers (for example, when the demand for one of the sub-system's outcomes decreases).

Learning effects. Learning effects are based on the assumption that the more often an activity is performed, the more efficiently and proficiently it can be performed (Argote 1999). Thus, it becomes increasingly beneficial to adhere to already familiar activities, as the returns of constantly improving and deepening them are more certain and pay off in the short term. The constant recourse to and further development of what is already known is what the literature defines as *exploitative learning* (Levinthal and March 1993; He and Wong 2004; Raisch and Birkinshaw 2008). Consequently, *"exploitation is gained via local search, experiential refinement, and selection of existing routines"* (Baum et al. 2000, p. 768). While focusing on exploitative learning, exploratory learning (i.e., performing new activities for which new competencies must be learned) becomes less and less attractive (Baum et al. 2000; Raisch and Birkinshaw 2008). As for the latter, returns are more uncertain and might only be realized in the long term, if ever (March 1991; Levinthal and March 1993). Thus, companies typically tend to continuously focus on exploiting existing businesses, technologies, and competencies instead of switching to new businesses or technologies. As a result, activity patterns become increasingly stabilized.

Coordination effects. Coordination effects are rooted in adherence to organizational rules, guidelines, processes, procedures, norms, and values (Kaplan and Henderson 2005). Indeed, the more actors internalize and adopt activity-controlling guidelines, norms, and values, the higher the efficiency of their interactions (Kaplan and Henderson 2005). Thus,

according to Martinez and Jarillo (1989), coordination represents a central element of organizational theory, consisting of three key structural and formal mechanisms: Centralization; formalization and standardization; and planning, budgeting, and goal setting.

First, coordination is the result of the level of centralization versus decentralization of decision making (Pugh et al. 1968; Martinez and Jarillo 1989), that is, improving control through centralizing activities and thus realizing efficiency gains. Second, coordination is based on the level of formalization and standardization, that is, the extent to which policies, rules, and procedures are defined through written documents (Pugh et al. 1968; Martinez and Jarillo 1989). Third, coordination is the result of planning, budgeting, and goal setting in order to guide and channel individuals' activities (March and Simon 1958; Martinez and Jarillo 1989). Wolf and Floyd (2017) argue that planning has been identified as a key mechanism for integration and coordination.

Thereby, the coordination of organizational activities provides stability and guidance for corporate actors. As a result, operating processes and procedures become increasingly streamlined and automatized and thus more efficient. On the downside, however, activity patterns increasingly become stabilized, which in turn implies greater difficulty in adapting them (Gilbert 2005).

Expectation effects. Finally, the literature argues that expectation effects, based on the logic of observation, shape organizational paths (Sydow et al. 2009). Hence, observations of the first actor's activities stimulate the expectations and subsequent activities of the second actor, in turn affecting the expectations and subsequent activities of the first actor

(Luhmann 2012). More practically stated, expectation effects are based on people's aspiration for social belonging and desire to be on the winning side (Haller and Norpoth 1994). This phenomenon is frequently explained by the bandwagon effect, arguing that people trust the wisdom of the majority (Leibenstein 1950). While seeking the legitimacy of actions and decisions, organizational actors undertake specific activities as they expect others to confirm or even to do the same. In this way, they favor the winning solution, such as in terms of investment decisions (Haller and Norpoth 1994). As a result, one dominant solution emerges that increases the returns for those who wanted to be on the winner's side (Pierson 2000).

Moreover, expectation effects are grounded in the concepts of social control and belonging (Leibenstein 1950; O'Reilly 1989; Haller and Norpoth 1994; O'Reilly and Chatman 1996; Pierson 2000; Luhmann 2012), that is, informal and unwritten norms and social expectations in the form of common agreements among actors that constitute appropriate behavior and a feeling of belonging (O'Reilly 1989). As a result, expectation effects lead to increasingly stabilized activity patterns that might be suboptimal at a certain point in time but are difficult to change.

3. EMPIRICAL RESEARCH SETTING

Experience without theory is blind, but theory without experience is mere intellectual play.

Immanuel Kant

3.1. GERMAN UTILITY MARKET

This research focuses on the specific development of six German utilities (to be referred under the pseudonyms Alpha, Beta, Gamma, Delta, Epsilon, and Zeta) in the time period between 1999 and 2015. Thereby, the German utility market provides an ideal empirical research setting to study self-reinforcing mechanisms and their influence on organizational adaptation. After the Second World War, the market was characterized by a monopolistic system in which regional companies held exclusive rights for the supply of energy. In this phase, market participants began to shape their own developmental paths, which were strengthened and rigidified in subsequent years. In this context, cycles of change lasted up to 15 years. Clear attention was paid to enhancing energy generation capacities in order to secure energy supply. From 1945, domestic coal was the primary energy source. During the 1960s, increased focus on lowering energy prices in order to support the exporting German economy led to the replacement of coal by oil as the primary energy source. After the worldwide oil crisis in 1973, the focus of energy generation shifted again. Gas and nuclear power plants increasingly gained importance due to their high capacities and relatively low CO2 emissions compared to other energy

sources. Indeed, the latter in particular became an essential element of German energy generation in the 1990s.

With market liberalization in 1999, the stage for the entrepreneurial actions of market participants was set. One former CEO of Alpha stated that *"the situation at that time was that companies became bigger and bigger (...) and then actually everything changed abruptly with market liberalization."* Certainly, liberalization established the starting point for entirely new market conditions that all market participants entered under similar assumptions.

Since the liberalization, the market has been characterized by a large number of rapid and revolutionary changes. The former CFO of a renewable energy project developer stressed that *"the German energy supply market was subject to revolutionary changes based on the interventions of the German government turning existing market mechanisms upside down."* Thus, market dynamics were mainly driven by consumers becoming more environmentally conscious, emerging technologies of energy generation (e.g., the development of renewable energies), and frequently changing legal requirements in terms of policies and laws (e.g., the lifetime extension of nuclear power plants and the subsequent nuclear phase-out).

Within the liberalized energy market, political interventions constantly increased the level of uncertainty for market participants, although on the other hand, politics created an artificially stable but (at least initially) less profitable market segment through the subsidization of renewable energies by guaranteeing feed-in remunerations for 20 years. Thus, within this highly dynamic and unpredictable energy market, the sub-segment of

renewable energy became even more predictable, as ordered by the administrative authority.

Within this market development, the field of energy generation was especially affected by frequent changes in framework conditions. Traditional businesses such as coal, gas, and nuclear power generation became obsolete, at least for a certain period of time until the regulations changed again. For example, the introduction of tradable CO2 certificates in 2005 had put gas power plants in an advantageous position compared to other fossil energy sources like coal, because of the former's lower pollution load in energy generation. However, owing to a rapid and ongoing price decline in CO2 certificates, such formerly beneficial investment assumptions for gas power generation increasingly became invalid, as even the most efficient gas power plants could no longer be operated with lower marginal costs of production than coal power plants.

Similarly, in 2010 the decision of the German government to extend the lifetimes of nuclear power plants for 12 years on average favored energy suppliers that owned or held shares in nuclear energy generation. However, just one year later, the German government underwent a radical turnaround in energy policy by declaring an ultimate nuclear phase-out, with eight German nuclear power plants directly shut down. Besides renewable energies, this decision again brought other conventional energy sources like gas and coal to the fore.

As a result, market participants were compelled to reallocate resources (financial resources, human resources, and management attention) to new businesses and technologies such as solar or wind energy, or even provide energy-related services, in

order to remain competitive and viable in the long run. Indeed, the former CEO of Alpha underlined that *"all those investments in conventional energy generation have ultimately no longer paid off, so that today we are facing a situation in which all utilities have to come up with a new business model."*

Accordingly, organizational adaptation to new circumstances and thus the process of resource (re)allocation became of critical importance, especially as investments in conventional energy generation typically had long investment periods of up to 20 to 30 years, whereas profits were only realized within the final *golden years* of this period.

3.2. MARKET DEVELOPMENT

In order to investigate the strategic actions of the focal firms and to contextualize their decisions, it is important to possess an in-depth understanding of the market dynamics and key milestones that shaped the market development. Thus, the present section of this dissertation provides a detailed overview of the historical development of the German utility market, which on the basis of key milestones can be divided into five definable phases (Table 1), as described below.

Pre-liberalization phase 1945–1999	Phase I: Liberalization & Energy Turnaround 1999–2004	Phase II: Harmonization of Competitive Conditions 2004–2009	Phase III: Nuclear Lifetime Expansion 2009–2011	Phase IV: Second Energy Turnaround 2011–2015
・German energy supply market as a key enabler of the reconstruction of the German economy after the Second World War ・Subject of profound political interventions and state-regulated over decades to secure energy supply ・Historically evolved adherence to domestic energy sources, i.e. coal ・Nuclear energy as an essential element of German energy generation in the 1990s	・Liberalization set the conditions for entrepreneurial behavior against the backdrop of up to 50 years of market monopolies ・Renewable Energies Act guaranteed feed-in remunerations for renewable energies for 20 years and enforced obligation to primary include renewable energies into the grid ・Limitation of the period of validity of existing nuclear power plants	・Amendment of the Renewable Energies Act set concrete goals for the expansion of renewable energies ・Energy Economic Law established Federal Network Agency to be in charge of the energy grid and forced firms to separate their network operation units from their energy sales units ・Adoption of the European Union Emissions Trading System introduced CO2 certificates as additional production costs for energy generation ・Worldwide financial crisis led to a continuing general decline in demand	・Amendment of the Renewable Energies Act reduced the future feed-in remuneration for photovoltaic plants to mitigate the risk of over-supporting the technology ・Amendment of the Atomic Energy Act enforced the lifetime expansion of nuclear power plants for twelve years on average ・Market competition increased due to municipal energy suppliers increasingly applied for operating the distribution grids	・Ultimate nuclear phase-out: Direct shut down of eight nuclear power plants and decision to shut down the remaining nine German plants until 2022 ・Coal and gas energy to compensate for the retirement of nuclear power and the variations of renewable energy generation; however, as a back-up solution these power plants did not have the required operating hours to be profitable ・Price decline of CO2 certificates by up to 80 percent accelerated the profitability loss of gas power plants

Table 2: Phases of Market Development

3.2.1. PRE-LIBERALIZATION PHASE (1945–1999)

Following World War Two, the German energy market became of critical importance to the reconstruction of the German economy, and was accordingly the subject of profound political interventions. Due to its significance (and in spite of liberal economic policies), the German energy market was for decades largely state-regulated. The market was divided into separate supply areas for which a small number of national, regional and municipal energy suppliers enjoyed exclusive rights for energy supply. Hence, eight companies generated and distributed the majority of energy required.

Within the early years of market development after 1945, the central condition was to secure energy supply while overcoming supply shortages through expanding capacities. Consequently, mainly domestic energy sources like coal were used for energy generation.

Despite significant competitive disadvantages compared to foreign coal production (e.g., high costs for underground mining in Germany versus opencast mining abroad), coal became the primary energy source. Competitive disadvantages were compensated by high governmental subsidies, a situation that remains true today.

During the 1960s, security of supply (the previous key target of German energy politics) was replaced by growing focus on lowering energy prices in order to support the exporting German economy. Accordingly, oil replaced coal as the primary source of energy generation in the 1960s. However, the worldwide oil crisis in 1973 stimulated a change in perception of oil as a source of energy generation. Indeed, oil was no longer considered the most advantageous energy source. Instead, focus shifted toward a more diversified supply consisting of nuclear power as the primary source of energy generation due to its cost efficiency. The building of pipelines from Russia to Germany from the 1970s resulted in gas also becoming an essential element of the German energy mix.

However, since the 1980s, growing environmental consciousness has come to challenge nuclear power and the pollution load of energy generation from fossil fuels. In response, politicians opted to reduce CO2 emissions, but also decided to adhere to nuclear power as an essential element of German energy generation in the 1990s. In line with this increased awareness of environmental and climate protection, renewable energies have also been promoted by politicians.

At the end of 1996, the European Union (EU) pushed for the liberalization of national energy grids while attempting to establish an internal European energy market. The major

reason behind this guideline was to foster overall price reductions for energy and to force energy companies to improve their customer service.

3.2.2. PHASE I: LIBERALIZATION AND ENERGY TURNAROUND (1999–2004)

In Germany, the EU guideline was implemented in 1998, resulting in the complete liberalization of the German energy market in 1999.[1] The conditions for entrepreneurial behavior of energy companies were created through opening the market to new competitors. However, the entry of new market participants was constrained by the Associations Agreement [German: Verbaendevereinbarung] in the first place, stipulating that prices for the utilization of energy grids are determined by associations of network operators and network users. Moreover, high market entry barriers hampered competition at that time, these being particularly pertinent in the energy generation business due to the considerable investment costs required to build power plants.

Despite these drawbacks, the liberalization represented a significant break in the development of market incumbents, especially against the backdrop of up to 50 years of market monopolies. Energy companies were suddenly confronted with price decreases resulting from overcapacities due to energy imports from neighboring countries. As a consequence, the energy sales business was no longer profitable. Following the market

[1] Given that market mechanisms were disabled during this pre-liberalization phase, this paper concentrates on the development of the German energy market and its market participants since the liberalization in 1999. Nevertheless, an understanding of the market development before 1999 is crucial to fully comprehend the individual developments of the focal firms.

liberalization, the newly elected German government set two groundbreaking priorities in environmental and energy policy.

First, in April 2000 the Renewable Energy Sources Act came into force with the key target of increasing the share of renewable energies in the energy supply to 60 per cent by the year 2035. Essential components of the Renewable Energy Sources Act were a feed-in remuneration for renewable energy guaranteed for 20 years, and an obligation for network operators to primarily include renewable energy into the grid. To this end, the German government created a stable and predictable sub-segment within the highly dynamic German energy market. Associated with this law, politicians promoted new technologies that were not competitive at this time, bringing about a radical change in the classic merit order, i.e., the ranking of available energy sources depending on their marginal costs of production. Starting with the lowest, energy sources with greater marginal costs of production will be added as long as energy demand is covered. By prioritizing renewable energies, politicians suspended the existing market mechanisms, leading to decreased profitability for conventional power plants:

> *The Renewable Energy Sources Act has led to the fact that the classic merit order, the order in which power plants are switched on, has been completely thrown out of kilter and the business case for many investments in gas power plants has been destroyed.*
>
> Former Manager, Internal Consulting, Beta

Second, in June 2000 the German government agreed with German energy companies to limit the period of validity of existing nuclear power plants. The concrete termination of two existing nuclear power plants in 2002 and 2003 was also decided. A closure of nuclear power plants amounted to significant losses of earnings for plant operators,

because on the one hand, these power plants typically operate at lower marginal costs of production than any other source of energy generation, and on the other, the removal of nuclear power plants incurs significant costs for their operators (e.g., disposal costs for nuclear waste). In contrast, energy companies not possessing nuclear power plants benefited from the lifetime limitation, as their conventional power plants experienced greater utilization by climbing upwards in the merit order.

3.2.3. PHASE II: HARMONIZATION OF COMPETITIVE CONDITIONS (2004–2009)

In 2004, the first amendment to the Renewable Energy Sources Act entered into force. The law scheduled concrete goals and milestones for the expansion of renewable energies. In 2010, the share of renewable energies in the energy supply was planned to be 12.5 per cent, and at least 20 per cent by the year 2020. This first amendment accelerated the expansion of renewable energies and thus led to further shifts in the merit order.

In order to create an equal playing field for all market participants, politics underwent two changes in the economic framework of the energy market via the second amendment to the Energy Economy Law [German: Energiewirtschaftsgesetz (EnWG)] in 2005, the removal of the Associations Agreement, and the unbundling of network operations and the energy sales business. By establishing the German Federal Network Agency (FNA) to take control of the energy grid, a governmental regulation replaced the Associations Agreement from 1999. Consequently, the level of influence of large energy companies was reduced, while competition increased.

The unbundling of network operations and the energy sales businesses represented another change in the competitive landscape that particularly applies to large utility companies covering the entire industry value chain. Energy companies had to separate their network operations and energy sales businesses in terms of customer data, accounting, management and legal structures, resulting in considerable negative synergies for the respective companies. Unbundling also increased levels of competition in the industry. The additional legal requirements represented a further burden to which market incumbents had to adjust, while lowering market entry barriers for new competitors.

As a vehicle of the European climate policy, the European Union Emissions Trading System (EU ETS) entered into force in 2005 with the objective to reduce CO2 emissions by means of low economic costs. The system was based on tradable CO2 certificates that had to be bought by companies producing CO2 emissions, such as in the energy generation business. At the beginning of the EU ETS, CO2 certificates were allocated to respective companies free of charge, thereby representing a significant competitive advantage for energy companies covering the value-added step of energy generation from fossil fuels in the first step. However, the requirement to buy CO2 certificates later engendered additional production costs for energy generation, especially in the case of technologies with high pollution loads, such as coal power plants. Accordingly, the EU ETS weakened the merit order position for coal power plants while strengthening that of the more emission-efficient gas power plants.

The worldwide financial crisis in 2007 also affected the energy industry while instigating a general decline in demand for the industrial sector, which was further intensified by

steadily growing environmental consciousness, especially in the private sector. As a result, energy companies were forced to cope with overcapacities in energy generation businesses, as well as declining prices.

3.2.4. PHASE III: NUCLEAR LIFETIME EXPANSION (2009–2011)

In 2009, a further change of government also affected German energy policy. The new German government passed the third amendment to the Renewable Energy Sources Act. The main subject of this amendment was the reduction in future feed-in remuneration for solar plants to mitigate the risk of excessive support for solar technology. In recent years, solar technology in particular has made great progress in becoming a competitive technology.

Following several months of dispute, the German government also passed an amendment to the Atomic Energy Act in 2010, determining the lifetime expansion of nuclear power plants for 12 years on average. This decision put the operators of nuclear power plants in a superior market position, as their power plants had by far the lowest marginal costs of production. By contrast, this decision put the operators of conventional power plants (e.g., coal or gas power plants) at a disadvantage, as they would suffer losses due to a lower ranking in the merit order and consequent lower utilization of their power plants. This is particularly evident whenever the proportion of renewable energies increases, as was desired by law at that time.

2010 was characterized by a renaissance of municipal utilities. Having sold their distribution grids to private energy companies in the 1990s, numerous cities and

municipalities were now interested in licenses to operate the distribution grids in order to generate stable and long-term income streams. This period was favorable, because in the following two years, over 2,000 licenses would expire. For market incumbents, the renaissance of municipal utilities implied another increase in competition, and in the case of losing licenses to those newcomers, losses of earnings contribution for contemporary network operators.

3.2.5. PHASE IV: SECOND ENERGY TURNAROUND (2011–2015)

Less than five months after the German government decided to expand the lifetime of nuclear power plants, a tsunami destroyed considerable parts of the nuclear power plant in Fukushima, Japan. In three out of six power plant units, a core meltdown occurred. Three months after this natural catastrophe, the German government underwent a radical turnaround in energy policy by declaring an ultimate nuclear phase-out until 2022. Eight German nuclear power plants were directly shut down, while the remaining nine were to be taken off the grid incrementally between 2015 and 2022. As a result of this radical change in direction, the losses of earnings contribution for operators of nuclear power plants ran into the billions.

> *The energy market in particular is a very political market and the interventions we have seen in recent years, one cannot say that they have only affected some banana republics like somewhere in Latin America, but rather they have happened right here in Germany, for example the interventions we saw in nuclear energy a few years ago. (...) ultimately leading to a significant increase in uncertainty.*
> Senior Manager, Group Controlling & M&A Valuation, Alpha

At this time, renewable energy capacities were not sufficient to compensate for the missing capacity from the nuclear phase-out, as the expansion of renewable energies had not yet become well-developed. Thus, renewable energies required a back-up solution, as such energy generation is characterized by a high level of volatility due to being dependent on environmental conditions (e.g., in times of still air, wind turbines are unable to generate energy). In order to compensate for the retirement of nuclear power as well as variations in energy generation by renewable sources, politicians adopted a program to accelerate the expansion of coal and gas energy. The latter is particularly suited to compensating for variations in renewable energy generation given its flexibility, whereas the former is capable of providing a stable base load supply.

Since 2013, earnings from the conventional energy generation business steadily decreased due to highly subsidized renewable energies. Based on their role as a back-up solution for renewable energies, the utilization hours of coal and gas power plants continuously declined and, as consequence, most conventional power plants can no longer be operated at a profitable level. In its Annual Report 2011, Delta summarized the situation as follows:

> *The current development of the energy market is having a particularly negative impact on the profitability of conventional energy generation. This development is due in particular to the ever-increasing expansion of renewable energy capacities. The promotion of this form of generation is regulated by the Renewable Energy Sources Act. According to this Act, energy from renewable sources has a feed-in priority over other forms of generation and a guaranteed remuneration, regardless of the development of prices on the energy exchange. As a result, the utilization of conventional power plants continues to decline while shutdowns become unavoidable. (...) Under the current market conditions, new investments in conventional power plants are not profitable. The preliminary results of currently available electricity price forecasts even show that it will hardly be possible to cover the costs of power plant operations in the next few years.*

This development was catalyzed by declining prices for CO2 certificates by up to 80 per cent from 2011. At its peak, the price for one CO2 certificate was 30 to 40 euros per ton of CO2. At this price point, coal power plants were no longer profitable; more efficient gas power plants represented the preferred alternative. However, due to the price for CO2 certificates rapidly declining to three euros, even the most efficient and modern gas power plants could not be operated with lower marginal costs of production than coal power plants.

Nevertheless, given their relevance to the system through providing a stable energy supply, the regulatory authority only allowed the shutdown of these gas power plants following a thorough examination, implying that certain energy companies were tied to assets, constantly operating at a loss.

> *Many utility companies in the industry are faced with the decision to close unprofitable power plants. (...) The government has also severely restricted the right of power plant operators to decommission their plants, including a decommissioning ban for so-called system-relevant power plants.*
>
> Management Report 2012, Gamma

To cope with these frequent changes and challenging market conditions, organizational adaptation by market participants has actually become more significant than ever.

4. METHODOLOGY

I never guess. It is a capital mistake to theorize before one has data. Insensibly one begins to twist facts to suit theories, instead of theories to suit facts.

Sherlock Holmes (Sir Arthur Conan Doyle)

4.1. CASE SELECTION

To study the influence of self-reinforcing mechanisms on organizational adaptation, a comparative multiple-case study approach is applied (Druckman 2005; Yin 2009). According to Teece (2012), case studies provide a promising avenue for research in order to enhance understanding of theories, and are likely to create powerful insights. Thereby, one major strength of case studies is that the theoretical implications they yield are likely to be empirically valid, as theory building and theory advancement are closely tied to empirical evidence (Eisenhardt 1989, p. 547). Case studies have been deemed particularly appropriate when knowledge about a phenomenon is rare and there exists little empirical substantiation (Eisenhardt 1989; Anderson et al. 1999; Creswell and Clark 2007; Edmondson and McManus 2007; Eisenhardt and Graebner 2007), as is true of research on path dependence (Vergne 2013). Indeed, previous research on organizational path dependence has explicitly requested that future research utilize a multiple-case design that allows for cross-case comparison and enables emphasis to be placed on the embeddedness of focal firms in a certain industry setting (Schreyoegg et al. 2011).

In contrast to a single-case study approach, multiple cases enable repeated observations of certain phenomena in different contextual settings, augmenting levels of theoretical

generalizability as a result (Eisenhardt 1989; Eisenhardt and Graebner 2007; Yin 2009). According to Eisenhardt and Graebner (2007, p. 27), multiple-case studies create more robust, generalizable, and testable theory compared to single-case study research, as the implications they derive are based on varied empirical evidence.

The case studies provided in this dissertation describe the development of and discuss the reasons behind the particular courses of action taken by six German utility companies (to be referred under the pseudonyms Alpha, Beta, Gamma, Delta, Epsilon, and Zeta). Certainly, case selection was guided by the intention to contrast the idiosyncratic development of firms with both similar and dissimilar initial resource equipment and that were compelled to cope with rapid and revolutionary changes in a comprehensively altered liberalized utility market. Thus, the cases were selected to create a diverse sample of focal firms in order to increase the number of possibilities for comparison and consequently ensure richer theory development (Glaser and Strauss 1967; Strauss and Corbin 1990; Danneels 2002). Indeed, case selection allowed for cross-case comparison in order to highlight the idiosyncratic aspects that influenced the development of any one of the focal firms (Miles 1979).

The cases were divided into three groups, with each group containing two focal firms (Table 3). Group A contained market incumbents that possessed their own conventional energy generation capacities at the time of the market liberalization and found themselves in a state of lock-in at the end of the research time period. By contrast, groups B and C comprised companies that were newcomers in the utility market, only covering selected value-added activities at the beginning of the research time period. The companies in

groups B and C did not possess their own energy generation capacities at the time of the market liberalization.

Company	Group	Resource equipment as at 1999/ 2000	Development	Situation as at 2015
Alpha	Group A: 'Incumbent' (large-scale MNE)	Own energy generation capacities	• Strong focus on accelerating conventional energy generation capacities (focus on coal and nuclear power plants) • Strong focus on exploration business (coal extraction) to realize synergy potentials with conventional energy generation • Restrained and late development of renewable energies business (development of own renewable energy projects) • Late (small) steps to enter energy-related service business • Limited financial resources available to seize alternative options	Path dependence/ lock-in
Beta	Group A: 'Incumbent' (large-scale MNE)	Own energy generation capacities	• Strong focus on accelerating conventional energy generation capacities (focus on gas and nuclear power plants) • Strong focus on exploration business (gas and oil extraction) to realize synergy potentials with conventional energy generation • Development of large-scale renewable energy projects (mainly through acquisitions of on- and offshore wind farms) • Small steps to enter energy-related service business (earlier focus on energy-related service business than Alpha) • Late (restrained) refocus on less capital intensive businesses – Investments in optimizing existing conventional energy generation capacities until 2012 • Limited financial resources available to seize alternative options	Path dependence/ lock-in
Gamma	Group B: 'Newcomer' (small to medium-sized regional utility company)	No own energy generation capacities	• Investments in developing own energy generation capacities • Large-scale investment program in renewable energies and conventional energy generation (gas power plants) to compensate for volatile renewable energy generation • Development of (energy-related) service business • Focus on wind power within renewable energies portfolio, divestiture of foreign solar power businesses and extension of the value-added depth through developing own project planning capabilities and capacities in wind power • Limited financial resources available to seize alternative options – Divestitures and cost reduction to increase the financial scope for action	Path dependence/ lock-in
Delta	Group B: 'Newcomer' (small to medium-sized regional utility company)	No own energy generation capacities	• Early investment in conventional engergy generation and development of own conventional energy generation capacities • Continuous acceleration of conventional energy generation business • Restrained development of renewable energies business • Failed attempts to generate alternative income streams in the energy grid business and the acceleration of the renewable energies business • Late entry into energy-related service business • Limited financial resources available to seize alternative options	Path dependence/ lock-in
Epsilon	Group C: 'Newcomer' (small to medium-sized regional utility company)	No own energy generation capacities	• Development of own energy generation capacities • Early refocus of energy generation strategy to enter the renewable energies business • Investment into energy storage technologies and extension of the value-added depth through developing own project planning capabilities and capacities • Development of (energy-related) service business • Diversification of renewable energies portfolio	Path breaking
Zeta	Group C: 'Newcomer' (small to medium-sized regional utility company)	No own energy generation capacities	• Stop constructing own conventional power plant and exclusively focus on renewable energy generation • Large-scale investment program in renewable energies (including developing own project planning capabilities and capacities) • Strong focus on energy grid business to generate stable income streams • Early entry into energy-related service business and accelerated expansion • (Preliminary) termination of renewable energy/ wind power projects due to increased market uncertainties	Path breaking

Table 3: Brief Overview of Focal Firms' Development

Although similar to the group A companies, the focal firms in group B encapsulated path-dependent development, leading them to strategic lock-in in 2015. Conversely, Epsilon and Zeta, the two focal firms in group C, were able to unlock their once entered path of development while reallocating resources to new technologies and business segments.

Thus, the case selection ensured that resource equipment would not constitute the factor driving firm development, while highlighting the assumption that there are other influencing factors in the form of self-reinforcing mechanisms at play.

4.2. DATA COLLECTION

Data collection was based on various sources and types of data that could provide a rich and solid foundation for theory development (Eisenhardt 1989; Danneels 2002; Gibbert and Ruigrok 2008; Yin 2009). The data gathered covered the research time frame between the liberalization of the German energy market in 1999, and 2015. The first step of data gathering was based on the development of *"a comprehensive collection of publicly accessible evidence,"* including business and trade press articles, and annual reports regarding the six focal firms (Danneels 2010, p. 3). The archival data collected thus comprised more than 2,500 pages of evidence.

In a second step, archival data were supplemented with primary data gathered through interviews, in-depth discussions, and workshops with the top-level executives and senior managers of each focal firm to discuss the firms' specific development paths and identify the key milestones shaping them, as well as the effects and mechanisms that reinforced their existing resource allocation patterns. Interviews were focused in nature, i.e., semi-

structured interviews that were open-ended, but followed a certain set of questions derived from the path dependence literature (Yin 2009). See Appendix 1 for a detailed list of interview topics.

All interviews, in-depth discussions and workshops were conducted face-to-face or by telephone. Verbatim is only presented here with the title of the interviewee and the pseudonym of the firm in order to maintain confidentiality. Thus, each quotation may refer to any holder of such a title within the research time frame. Interviews lasted between one and two and a half hours and were recorded with permission. Recordings were transcribed verbatim. In total, the primary data comprised more than 51 hours of interactions, and more than 120 pages of interview transcripts and notes (Table 4).

Company	Interview Partner	Interaction Type	Total Time of Interaction (Hours)
Alpha	Senior Manager, Group Controlling & M&A Valuation	• One interview lasting 1 hour	1.0
	Former CEO	• One interview lasting 1 hour	1.0
Beta	Former Manager, Internal Consulting	• One interview lasting 2 hours	2.0
	Division Head, Corporate M&A	• One interview lasting 1 hour	1.0
Gamma	CEO	• Three in-depth workshops lasting 2 hours each	6.0
	Senior Manager, Business Development	• One interview lasting 1 hour	1.0
	Manager, Group Controlling	• Three in-depth workshops lasting 2 hours each	6.0
Delta	Division Head, Business Development	• One in-depth workshops lasting 2 hours	2.0
	Senior Manager, Business Development	• One interview lasting 1 hour • Two in-depth workshops lasting 2 hours each	5.0
	Former Senior Manager, Business Development	• One in-depth workshops lasting 2 hours	2.0
Epsilon	CEO	• One interview lasting 1 hour • Two in-depth workshops lasting 2 hours each	5.0
	Division Head, Transmission	• One interview lasting 1 hour	1.0
Zeta	CEO	• One interview lasting 1 hour • Two in-depth workshops lasting 2 hours each	5.0
	COO	• One in-depth workshops lasting 2 hours	2.0
	Division Head, Sales & Distribution	• Two in-depth workshops lasting 2 hours each	4.0
Further Industry Experts	CEO, Regional Energy Supplier	• One interview lasting 1 hour	1.0
	Former CFO, Renewable Energy Project Developer	• One interview lasting 2.5 hours	2.5
	Partner and Industry Expert, Consulting Company	• One interview lasting 1 hour	1.0
	Senior Manager and Industry Expert, Consulting Company	• One interview lasting 2.5 hours	2.5

Table 4: Overview of Interviewees

For data accuracy reasons, the transcripts were again checked by the interviewees. Some of the interviewees subsequently provided further internal documents, such as decision proposals, meeting minutes, memos, and presentations, in order to support their statements.

Furthermore, firm-specific interviews were supplemented by four interviews with C-level executives of German utility companies and senior-level industry experts to verify the firm-specific interview materials and anchor the developments of the focal firms in industry context. Thus, by triangulating various types of data from different sources and gathered through different methods, the validity of the results was increased (Jick 1979; Eisenhardt 1989; Gibbert and Ruigrok 2008; Yin 2009). Following Yin (2009), all data collected were documented and organized within a case study database (to increase the reliability and the validity of the results) using the qualitative data analysis software NVivo 12.

4.3. DATA CODING AND ANALYSIS

Data stemming from different sources were coded through applying typical content analysis procedures according to Strauss (1985) and Yan and Gray (1994). Thereby, data were coded into categories and subcategories in accordance with the theoretical framework (Yin 2009) provided by Sydow et al. (2009). The five coding categories and respective subcategories represented the five self-reinforcing mechanisms and their corresponding dimensions identified in previous research (Sydow et al. 2009; Schreyoegg et al. 2011; Apajalahti and Lovio 2012; Schreyoegg and Sydow 2012): (1) scale effects;

(2) complementary effects; (3) learning effects (exploitative learning); (4) coordination effects; and (5) expectation effects. These dimensions all occurred as recurring patterns of influential factors on the process of resource allocation of the focal firms. The subcategories were economies of scale and economies of scope as dimensions of scale effects; growth opportunities in adjacent (and interrelated) areas and shared resources in term of skills, competencies, and customers as dimension complementary effects; efficiency improvements and the exploitation of existing business areas as dimensions of exploitative learning (learning effects); centralization, formalization and standardization, and planning, budgeting, and goal setting as dimensions of coordination effects; and aspirations for social belonging, social expectations, legitimacy seeking, striving to be on the winning side, and informal and unwritten norms as five dimensions of expectation effects. Table 5 presents examples of data coding.

Besides the subcategories proposed in the existing literature, further new dimensions of self-reinforcing mechanisms emerged during data analysis. With respect to exploitative learning (learning effects), for example, further dimensions that emerged during data analysis were the routinization of activities and the continuous improvement of existing competencies. A detailed description and discussion of emergent codes can be found in the findings section.

Data coding was conducted by two researchers in collaboration. First, the coding procedure was aligned with another senior researcher, for example to decide that coding units should be meaningful text fragments instead of stand-alone words in order to enrich the qualitative analysis and to put the codes into context (Vergne and Depeyre 2016).

Coding Category	Coding Subcategory	Example	Source
Scale effects	Economies of scale	*"With energy generation from coal, one can realize corresponding scale economies with a larger fleet of coal power plants."*	Senior Manager, Group Controlling & M&A Valuation, Alpha
	Economies of scope	*"One cannot simply reduce coal production by 50 per cent from one day to the next, because there are correspondingly large open-cast mines with corresponding plans behind them, which cannot be adapted to the market as flexibly as, for example, gas power plants, where gas supply contracts can simply be canceled."*	Senior Manager, Group Controlling & M&A Valuation, Alpha
Complementary effects	Growth opportunities in adjacent (and interrelated) areas	*"So, wind is so to speak our primary source of energy generation now. And as a complement to this volatile form of energy generation, flexible, low-CO2 power plants are needed, so gas power plants are exactly the right thing."*	Senior Manager, Business Development, Gamma
	Shared resources *(e.g. skills, competencies, customers)*	*"Horizontal integration between electricity and gas generates synergy and growth potentials from the convergence of the two energy sources, in particular through the increasingly important role of gas in electricity generation."*	Management Report 2004, Beta
Learning effects *(Exploitative learning)*	Efficiency improvements	*"The political developments following the natural and reactor catastrophe in Japan show that the risk of rapid changes in energy policy has grown. Increased regulatory interventions in the energy market also bear earnings risks that are countered by consistent cost management."*	Management Report 2011, Delta
	Exploiting existing business areas	*"One of our core competencies simply is the construction and operation of large-scale power plants. This is what we can do better than others."*	Division Head, Corporate M&A, Beta
Coordination effects	Centralization	*"We are increasingly meeting the rising demands on competitiveness by bundling our respective regional activities."*	Management Report 2002, Alpha
	Formalization and standardization	*"There is simply this ordinal system, that is, categorically whoever brings a better IRR, wins. We also have internal cost rates, which the whole company has to follow."*	Senior Manager, Business Development, Gamma
	Planning, budgeting, and goal setting	*"Some decisions were based on wishful thinking rather than on realistic assumptions. That is, those decisions were based on assumptions that made them look better."*	Former Manager, Internal Consulting, Beta
Expectation effects	Social expectations	*"We felt obliged and saw it as a social duty to provide stable energy supply based on conventional energy generation. We are the lifeline, the blood circulation of Germany. We owe it to our fellow citizens, our neighbors, our local companies, to get the whole thing off the ground, because Germany needs reliable energy supply to prosper."*	Former Manager, Internal Consulting, Beta
	Aspiration for social belonging	*"Those managers came from history. They build the conventional energy generation of Beta and were simply long-established elder statesmen of Beta, who felt very connected to this conventional area. So decisions were made that, if someone from the outside looked at it totally dispassionate and weighed everything up, maybe those decisions wouldn't be made that way."*	Former Manager, Internal Consulting, Beta
	Being on the winning side	*"There was a kind of gold rush in the energy generation business. History has shown that you can print money with conventional power plants."*	CEO, Epsilon
	Informal and unwritten norms	*"The increasing market pressure on energy sales will also have to result in drastic group-wide cost savings. Only in this way we will succeed in sustainably ensuring the competitiveness of our business."*	Management Report 2008, Zeta
	Legitimacy seeking	*"Beta intensively participates in the exchange of opinions with all relevant social groups. We want to use our expertise to make the discussion of politically controversial issues more objective and to actively influence the conditions surrounding our activities."*	Management Report 2000, Beta

Table 5: Examples of Data Coding

Subsequently, both primary data (i.e., transcripts and research notes) and archival data (i.e., management reports, decision proposals, meeting minutes, memos, and presentations) were independently coded. The codes were discussed afterwards with the other senior researcher to ensure that no relevant text fragment was omitted. Furthermore, codes that did not clearly describe the strengthening or leaving of a certain development path were deleted. This procedure helped to increase the validity and the comparability of the results both across firms and over time (Vergne and Depeyre 2016).

The findings in the form of different dimensions of self-reinforcing mechanisms were accumulated to enrich understanding of scale, complementary, learning, coordination, and expectation effects. This bottom-up approach of condensing empirical findings to explanatory perspectives of theoretical phenomena contributes to the enhancement of theory (Sydow et al. 2012).

5. THE CASES OF GERMAN UTILITIES

There is nothing more difficult to take in hand, more perilous to conduct, or more uncertain in its success, than to take the lead in the introduction of a new order of things.

Niccolo Machiavelli

5.1. GROUP A: INCUMBENTS' LOCK-IN

Group A contains two large-scale diversified multinational utilities (MNEs) that entered the liberalized energy market covering the entire value chain, including own conventional energy generation capacities. Both Alpha and Beta possessed nuclear power plants and energy generation capacities from fossil fuels, i.e., gas and coal power plants. Within the research time period, both companies' development was subject to stabilizing forces that kept them on their once entered development paths and finally led Alpha and Beta into a state of strategic lock-in.

5.1.1. THE CASE OF ALPHA

The case of Alpha describes the development of a large-scale multinational utility company. Alpha entered the liberalized energy market already covering the entire value chain, including own conventional energy generation capacities, in particular coal and nuclear power plants (the company's core business). In the years following the market

liberalization, Alpha made massive investments to accelerate the expansion of its core business, as outlined in Figure 4.

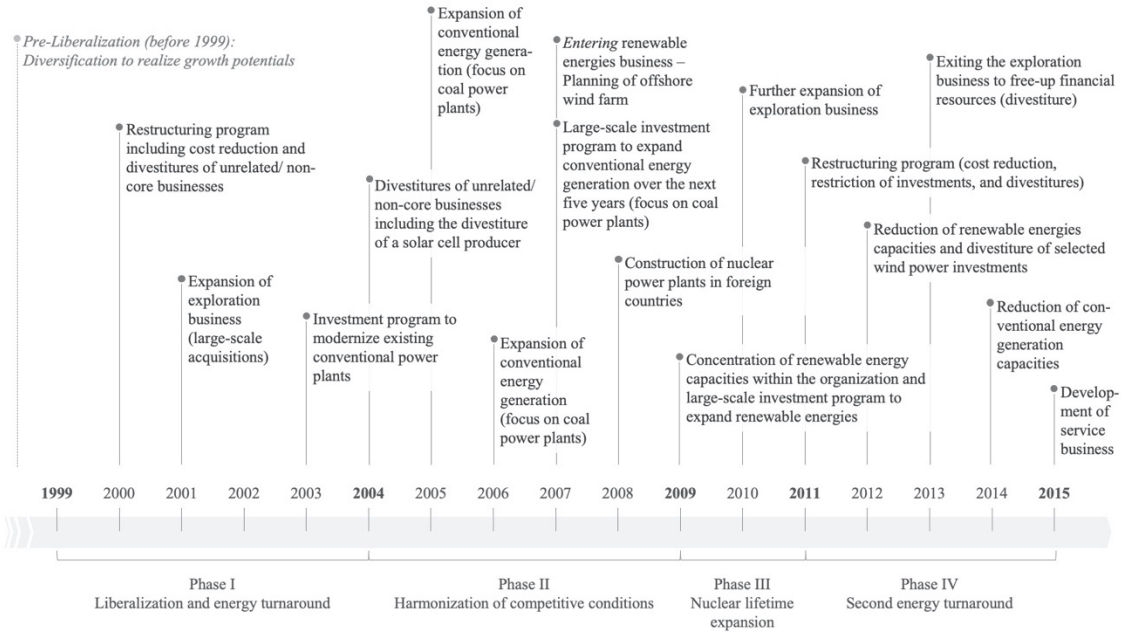

Figure 4: Key Milestones in the Development of Alpha

Even though the company built up renewable energy capacities, this future-oriented form of energy generation was always treated as by-product. Indeed, Alpha's focus constantly remained on conventional energy generation, even in times when changing framework conditions put conventional energy generation under enormous pressure, its future viability being questioned. However, the company's decisions did not lack consequences. Since 2011, Alpha has suffered constantly declining earnings, leading to annual deficits in 2013 and the years thereafter, and finally to a constantly shrinking scope of alternative available options.

Phase I (1999–2004). While over the years prior to the market liberalization Alpha had built up a large diversified conglomerate, immediately after the liberalization took place, the company took a different strategic direction to become a focused utility company. Thus, in the years between 1999 and 2004, Alpha recognized that in order be successful in the liberalized energy market, it would have to become more efficient and achieve a critical size in its core business of conventional energy generation by coal, gas and nuclear power plants and the exploration of raw materials, particularly coal and gas for its power plants. Thus, according to one Senior Manager, Group Controlling & M&A Valuation of Alpha, *"the market in which we are active ultimately begins with the energy generation (...) and with the extraction of coal for our power plants."*

In 2000, Alpha conducted a major restructuring program including efficiency improvement measures and divestitures of non-core businesses. According to Alpha's 2000/2001 Management Report,

> *As part of our cost-cutting program focusing on the energy generation business, we are reducing our workforce by 2004. (...) efficiency-enhancing measures, including the modernization of our power plant portfolio.*

With the divestitures of non-core businesses, Alpha freed up financial resources, which were reallocated to strengthen its core business. In particular, Alpha undertook large investments in the expansion of its exploration business in 2001 to further intensify the synergies between its exploration and energy generation businesses. Moreover, in 2003 the company implemented an investment program to modernize and enhance the efficiency of its existing power plant fleet. As one former CEO of Alpha explained:

> *We followed the old wisdom 'back to the roots': back to the core business. And then there was a wave of consolidation through the republic, when it was simply said that we have to become bigger in order to be able to play a role in the great Europe that is now open to us.*

In order to improve control and increase the manageability of the company, Alpha highly centralized its activities, but at the expense of flexibility, as would later became apparent:

> *There was a new constellation with larger core businesses. At the same time, of course, there was also a certain degree of centralization in the organization in order to increase the manageability of the whole thing.*
> Former CEO, Alpha

Phase II (2004–2009). In Phase II, Alpha continued its divestiture program including, among the divestiture of other businesses, the sale of a solar cell producer, which the company would later regret. Alpha further focused on realizing synergy potentials and efficiency gains in its core business of energy generation by fossil fuels and nuclear power plants as well as in its exploration business. As a result, technological advancements and innovations have increasingly moved out of the spotlight. Indeed, the company emphasized in its 2004 Management Report that:

> *Innovations are of comparatively little importance for our core business. Instead, efficient production processes and high security of supply are decisive for our competitiveness.*

The company's strong focus on exploiting synergies through the integration of its businesses became particularly obvious in its 2004 Management Report, which emphasized that *"we obtain coal from our own open-cast mines. (...) 89 percent of this coal was used for energy generation in our power plants."* Furthermore, the company highlighted in its 2005 Management Report that "*we achieve further synergies through*

horizontal integration, that is, by selling electricity and gas through one and the same group company."

However, the previously established interlinkages between the company's businesses also provided strong arguments and even the need to further intensify those interconnections. As one Senior Manager, Group Controlling & M&A Valuation of Alpha argued:

> *One cannot simply reduce coal production by 50 per cent from one day to the next, because there are correspondingly large open-cast mines with corresponding plans behind them, which cannot be adapted to the market as flexibly as, for example, gas power plants, where gas supply contracts can simply be canceled.*

Accordingly, Alpha further strengthened its footprint in conventional energy generation in the following years and invested in the expansion of its gas power plants in 2005 and again in 2006.

Nevertheless, in 2007 Alpha decided to diversify its energy generation portfolio through entering the renewable energies business. However, the company's focus still remained on its historically grown conventional energy generation business, while renewable energies were seen as a development – or even as a form of hype – with no real relevance for Germany or even for the company. Thus, according to Alpha's former CEO,

> *At the beginning one almost smiled at the situation, because the sun does not shine as it does in southern countries like Africa or Spain and the wind does not always blow, so renewable energies will not become a serious alternative.*

Thus, the decision of Alpha to enter the renewable energies business was less motivated by the conviction that this could be a promising and future-oriented business segment than by public pressure. As one Senior Manager, Group Controlling & M&A Valuation

of Alpha explained, *"(...) this was certainly due to market pressure, as we have seen that the market expects Alpha, as one of Europe's largest CO2 emitters, to invest in renewable energies."*

As Alpha's development was already focused on large conventional power plants even in the period before market liberalization, and the construction and the operation of its coal, gas, and nuclear power plants were regarded as the company's appointed core competencies, it was hardly surprising that Alpha also initially concentrated on large projects when it entered the renewable energy generation market. Alpha therefore planned to build an offshore wind farm, which promised the generation of renewable energy generation capacities somewhere on the scale of conventional coal or gas power plants.

However, Alpha was strongly driven by strict financial criteria concerning the profitability of investments that determined whether an investment would be pursued or not. Moreover, especially due to the company's experience with conventional energy generation, which in the past was extremely profitable, this profitability threshold was high. As the comparably low (but guaranteed) profitability of renewable energies – even that of large-scale renewable energy projects – did not meet Alpha's profitability threshold, the company ultimately decided against the construction of the offshore wind farm. According to one Senior Manager, Group Controlling & M&A Valuation, *"we have provided resources for the construction of an offshore wind farm, but then have decided against this project because it has not met our profitability criteria."*

Further, he stressed that:

> *We have clear expectations on the returns for our projects and they have to be met, and in the end profitability is always just one criterion, but ultimately it is also the decisive one.*
>
> Senior Manager, Group Controlling & M&A Valuation, Alpha

As a result, Alpha from then on was driving the expansion of conventional energy generation even more strongly. Shortly after the decision against constructing the offshore wind farm, Alpha announced a large-scale investment program in conventional energy generation, including the accelerated expansion of coal power plant capacities within the next five years. Thus, the company reallocated resources from energy generation by gas power plants to coal power plants, because this source of energy generation provided much higher potential for realizing scale economies and synergies arising from its own coal exploration business. As one Senior Manager, Group Controlling & M&A Valuation of Alpha explained, *"with energy generation from coal, one can realize corresponding scale economies with a larger fleet of coal power plants."* Thus, the decision against renewable energies was also highly affected by a lack of synergy potentials in this form of energy generation. As one former CEO of Alpha explained, *"with renewable energies, you do not have economies of scale at all."*

Although Alpha recognized the growing importance of climate-friendly energy generation and its responsibility as one of the largest CO2 emitters, the company interpreted this in a completely different way. Thus, this changing context did not cause the company to rethink its growth offensive in conventional energy generation in order to concentrate on truly climate-friendly renewable energies, *"which would then have been the adjusting screw,"* according to one former CEO of Alpha. Instead, the company devoted itself to CO2 reduction in its existing and planned coal power plants, as

emphasized in its 2007 Management Report: *"another core element of our CO2 strategy is to reduce emissions by modernizing our power plant fleet."* This constitutes an understanding from which the company has never deviated, not even until today; in fact it has become stronger over the years.

Thus, Alpha's focus remained on the development and continuous improvement of existing competencies and technologies instead of considering new technologies and forms of energy production. As mentioned in its 2008 Management Report, *"in the long run, we can only remain competitive if we continuously develop existing technologies."*

The high level of market dynamics, the associated growing uncertainty due to numerous political interventions in the general framework conditions, and the increasing importance of new technologies, especially in the field of renewable energy generation, were consistently not recognized by Alpha, or not taken seriously. Rather, Alpha's understanding of the German energy market was that of a highly stable market, as it certainly was in the pre-liberalization period:

> *Compared to other industrial sectors, however, the utilities sector is generally less vulnerable (...) Our investments in new power plants, grids and in gas and oil production show that this is the case: Energy supply is a long-term business model. We have to think in decades rather than years.*
>
> Management Report 2008, Alpha

As a consequence, Alpha's understanding of market mechanisms created an overconfidence in its own market position, which was seen as being long-term enduring. As the company argued in its 2008 Management Report, *"the European energy market continues to grow together. This is creating a top league of European utility companies to which Alpha belongs."* Thus, the decisions made in this second phase and the attitudes

and the (self-)understanding that have been solidified during this time have shaped the development of Alpha, even until now, and have maneuvered the company into an almost hopeless situation.

Phase III (2009–2011). At the beginning of Phase III, Alpha recognized the growing importance of renewable energies and undertook an important step to further accelerate the expansion of this new form of climate-friendly energy generation. Whereas Beta already took this step in 2007, two years earlier than Alpha, the latter decided to centralize all activities with a connection to renewable energies within a newly established division in order to realize economies of scale in this sector. Thus, according to one Senior Manager, Group Controlling & M&A Valuation of Alpha:

> *We had renewable energies in different parts of the company (...) and that was an essential cornerstone of the strategy* [to say]*, 'OK, we have to bundle the entire renewable energies business in order to also achieve economies of scale.' (...) Beta had already bundled its entire renewable energies business into a separate division one to two years before Alpha (...) and was therefore able to benefit from the corresponding markets earlier.*

Alpha (not only at the time, but even today) was strongly focused on its traditional conventional energy generation business, with which it was able to realize considerable synergies and scale economies. Accordingly, another reason for centralizing its renewable energies activities was to increase internal awareness for this *new* form of energy generation:

> *Renewable energies have had a rather subordinate role in the individual company divisions, because they were rather small and we have seen at this point that we have to place renewable energies more prominently, we have to pay more attention to them, because in the conventional business area we also had a whole series of hydroelectric power plants and the first wind power plants, but these of course lagged far behind conventional generation in terms of importance. And of course we have seen quite clearly that we have to do something about this, we have to centralize them, because otherwise the delicate little plant of renewable energies will always be in the shade of a big tree that takes the sun from it, to put it metaphorically.*
>
> Senior Manager, Group Controlling & M&A Valuation, Alpha

At that specific time, when Alpha had set up the necessary structures to drive the growth of renewable energies and had also invested in major renewable energy projects, the importance of such energies continued to become even stronger, while conventional energy generation and coal power plants in particular faced an increasingly challenging situation. The introduction of CO2 certificates progressively increased the price for coal energy generation and put a question mark over the long-term profitability of this type of energy generation. Thus, it would actually have been the right time to make a turnaround and focus on renewable energies. According to Alpha's CEO:

> *The debate had actually been going on for some time. In any case, the energy industry developed more and more toward decentralized energy generation, but we and the other large utility companies failed to draw the appropriate conclusions out of these developments or undertake an actual turnaround.*

Instead, Alpha ignored the warnings and opted to continue expanding its conventional energy generation capacities. The construction of its new coal power plant fleet proceeded. One Senior Manager, Group Controlling & M&A Valuation of Alpha defended this decision while stressing that *"the projects that you have started to build, you will of course finish them."* Indeed, the advocates of renewable energy generation were unable to win the battle against the defenders of Alpha's traditional core business

of conventional generation. As the Senior Manager, Group Controlling & M&A Valuation argued:

> *At the end of the day, you have to assert yourself with your investments, so you have to be able to convince other people as well, because it doesn't help if I alone am of the opinion that this is a good investment; you have to be able to convince others.*

Conventional energy generation is absolutely essential, especially at times when more and more energy is being generated by renewable sources. That was the company's deep conviction, which incidentally has remained the same to this day. Furthermore, reliable energy generation simply cannot be achieved through renewable energies, according to the company's understanding. Thus, Alpha highlighted that:

> *Our environment is determined by the expectation of customers that their energy supply is secure and that utility companies can control the effects of strongly fluctuating energy prices.*
> Management Report 2009, Alpha

To meet its customers' expectations, Alpha continued on its path and even accelerated the expansion of its coal exploration business, which in turn also strengthened arguments for the further expansion of its coal power plant fleet.

Phase IV (2011–2015). In 2011, the German government's decision to initiate the energy turnaround brought the importance of climate-friendly energy production to a new level, while increasing the pressure on Alpha in two ways. On the one hand, the announced nuclear phase-out as a consequence of the environmental catastrophe in Japan forced Alpha to shut down large parts of its nuclear power plant capacities, resulting in significant value adjustments that additionally burdened the company's earnings. On the other hand, the future prospects of Alpha's conventional energy generation business by

fossil fuels – in particular that of its high-emission coal power plant fleet – continued to deteriorate.

Although Alpha recognized the need for climate-friendly energy generation, arguing in its 2011 Management Report that *"only companies that take an active role will survive in the long term,"* the company's definition of climate-friendly energy generation remained focused on CO2 reduction in conventional energy generation instead of renewable energies. Thus, according to the company's 2011 Management Report, *"we are also making a contribution to climate protection by building highly efficient coal and gas power plants to replace high-emission old plants."*

Thus, at the end of 2011, the inevitable happened. Alpha suffered a massive collapse in earnings in the conventional generation business, which could not be compensated by its renewable energies business due to its insufficient share of renewable capacities. To cope with this challenging situation, Alpha resorted to former recipes for success and undertook a large-scale restructuring program, primarily comprising cost reductions and efficiency improvement measures. In its 2012 Management Report, Alpha stressed that *"we are countering the negative earnings trend in the energy generation business with efficiency-enhancing measures."* As the efforts made proved insufficient to improve the financial situation of the company, in 2012 Alpha even decided to reduce its renewable energy capacities. Thus, Alpha divested selected wind power investments and terminated any further investments in renewable energies:

> *One cornerstone of our climate protection strategy is the expansion of electricity generation from renewable energies. However, we have to slow down the expansion here due to financial reasons.*
> Management Report 2012, Alpha

Moreover, in 2013 Alpha exited its exploration business. The freed-up financial resources were reallocated to the conventional energy generation business to continue the construction program of new coal power plants initiated in 2007. Thus, as stated in the 2013 Management Report, *"our new power plant construction program remains the focus of our investment activities."* Consequently, despite ongoing pressure in the conventional energy generation business and growing uncertainty with respect to the future viability of coal power plants, Alpha still adhered to its development path and again undertook efficiency improvement measures to cope with the situation:

> *A large part of our efficiency-enhancing measures are also aimed at making our generation business, which has come under pressure, more profitable and thus securing our long-term position as one of the leading power plant operators in Europe.*
> Management Report 2013, Alpha

However, even with the efficiency-enhancement measures, Alpha was only able to improve its financial situation in the short term. The company failed to solve its basic problem, which was not the profitability of its conventional power plants, but rather the conventional power plants themselves. Due to the significant growth of renewable energy capacities over the past years, conventional energy was simply no longer demanded by the market, at least not to the extent Alpha had originally planned. So, in 2014, Alpha inevitably had to shut down a considerable extent of its conventional energy generation capacities:

> *Several conventional power plants have been shut down, especially older power plants, less efficient power plants, especially coal power plants, and also smaller power plants that can no longer keep up with their variable costs on the market.*
> Senior Manager, Group Controlling & M&A Valuation, Alpha

Even though this was another indication that future prospects for conventional energy generation were seriously threatened, Alpha made every effort to maintain its existing core business. Indeed, the company highlighted in its 2014 Management Report that *"we will concentrate on projects and measures that are necessary to maintain our business activities, especially for the operation of our power plants."* The growing financial pressure on the company was reflected in an increasingly restrictive investment policy. However, *"every investment that goes in the direction of efficiency improvements (...) is still being done,"* according to one Senior Manager, Group Controlling & M&A Valuation.

Only at the end of 2014 and under almost unbearable pressure did the company recognize the need to question its existing ways of thinking and behaving. In this context, Alpha realized the necessity of a more open corporate culture and the reduction of hierarchical thinking. According to its 2014 Management Report:

> *To contribute to the further development of our corporate culture: toward more openness and the ability to accept criticism, less hierarchical thinking, broader participation in decision making and stronger alignment of the individual and his or her organizational units with the goals of our company.*

Moreover, as opposing opinions and counterarguments were scarcely heard in the past, Alpha now wanted to become more open to new ideas and impulses:

> *At Alpha and in the company's environment there are many bright people who can help us to do this. We bring them together and give them the opportunity to explore business ideas without any constraints and to test promising innovations directly in the market.*
>
> Management Report 2014, Alpha

Finally, in 2015 Alpha underwent a change in direction with its entry into the energy-related service business. In fact, this was one of the last remaining options available to the company, on the one hand due to Alpha's very restricted financial situation, and on the other because the business is much less capital-intensive than any form of energy generation. One former CEO of Alpha summarized the current situation of the company as follows:

> *Given the history of investments made, we naturally tried to stick to it for as long as possible, and on the other hand, we did not have the funds available to enter into renewable energies on a large scale. (...) What Alpha will do is enter the less capital-intensive service business. Perhaps later, on a larger scale, into renewable energy production. But I think that the train has basically left the station, because in the next few years, Alpha will not have the required resources to build up the renewable energy capacities that will be necessary now (...) The money is simply not there. Alpha only has the possibility to enter the service business. (...) But that of course takes time and it seems to me to be the only possible alternative left.*

In conclusion, this case of Alpha has shown a company that has been able to continuously create new synergies between its businesses in order to become highly efficient in the end. However, the development has also uncovered a major weakness of the company associated with its focus on efficiency: its adherence to existing and historically proven ways of thinking and behaving, leading it to continuously prioritize existing businesses and technologies while not perceiving or even discounting ongoing market changes. As one former CEO summarized:

> *The parameters may not have been so prominent that one could have made scenarios and said, 'OK, if in the next five to ten years the share of renewable energies grows to that size, then that means the following for our conventional energy production possibilities.'*

Thus, even if the changing framework conditions were recognized by the company, Alpha was unable to draw the necessary consequences in terms of deviating from formerly made

decisions. Rather, Alpha committed to its decisions and the development path it has taken and tried to escape this challenging situation by an ever-increasing efficiency. Thereby, Alpha's highly routinized behavior and strict adherence to familiar and proven processes caused it to consistently neglect alternatives and ultimately put it in a situation in which alternative options were hardly available. As one Senior Manager, Group Controlling & M&A Valuation concluded, *"I think that openness to change would have been crucial: how quickly am I able to adapt to change, and accordingly to react"* to changed circumstances.

5.1.2. THE CASE OF BETA

Similar to Alpha, Beta is a large-scale multinational utility company, which at the time of the market liberalization covered the entire value chain, especially in terms of the exploration of raw materials and the operation of its own conventional energy generation capacities. Over the years, Beta has significantly increased its gas exploration business and its corresponding capacities in gas power generation, as shown in Figure 5. Albeit mainly through acquisitions rather than the construction of its own wind and solar parks, Beta has built up significant renewable energy capacities, even at an early stage. Beta also entered the energy-related services business earlier than its largest competitors. Thus, one would assume that at the end of the observation period, Beta would be in a more advantageous position than Alpha. However, this is not the case.

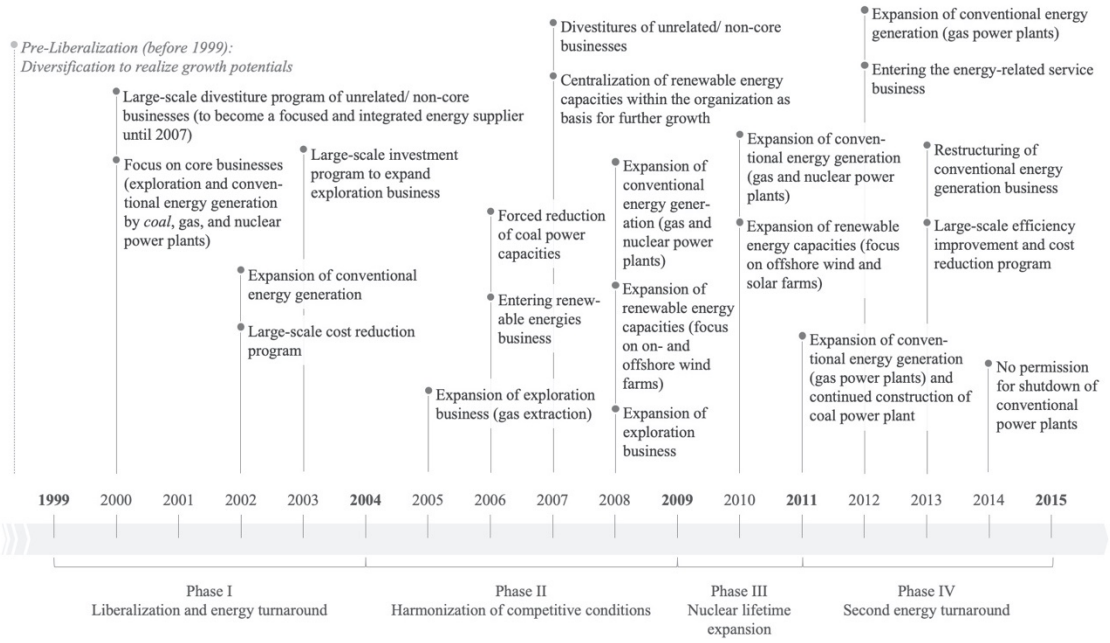

Figure 5: Key Milestones in the Development of Beta

Although Beta's flexible gas power plants were well-suited to balancing fluctuations in energy generation from renewable energy sources by wind or solar power, the price collapse for CO2 certificates significantly reduced their profitability, particularly in comparison to other forms of conventional energy generation, leading the company into an extremely challenging and financially strained situation. Furthermore, despite the fact that Beta had a comparably large renewable energies business that could compensate for losses in the conventional business, this proved insufficient.

Phase I (1999–2004). Similar to the development of Alpha in the years immediately after the market liberalization, Beta was strongly focused on size and efficiency, as was generally considered the order of the day. While Beta became a large diversified conglomerate in the years prior to the liberalization, the company initiated a large-scale

divestiture program in 2000 to dispose its unrelated non-core businesses until 2007 while then growing from the core. Thus, the freed-up financial resources were continuously reallocated to strengthen Beta's core business of gas extraction and conventional energy generation, particularly by gas and nuclear power plants. Thus, according to the company's 2001 Management Report, *"Beta is now exclusively concentrating on its core energy business and is consistently driving forward its expansion in the electricity and gas sectors."* In contrast to its largest competitors, Beta accelerated the expansion of its core business primarily through acquisitions rather than through organic growth, and was therefore able to quickly build up the required scale. One Division Head, Corporate M&A of Beta argued that *"first you have to have a critical mass to be taken seriously."*

Having emerged in a monopolistic market where there was hardly any form of competition and prices were almost fixed, Beta was suddenly confronted with a completely different situation. In its 2002 Management Report, the company emphasized that:

> *The market environment in which Beta operates is characterized by increasingly intense competition. Our energy business in particular is exposed to price and sales risks in the liberalized energy markets. We minimize these risks through our ongoing cost management and restructuring measures.*

Thus, to cope with the new market dynamics, efficiency improvement measures through cost reductions represented the company's preferred response. This was certainly an adequate mean at this time and particularly in the short term. However, as the following years have shown, taking measures to increase efficiency soon became the company's first response to all new situations and challenges.

In 2003, Beta undertook further steps to expand its exploration business in order to increase the synergy potentials resulting from the combination of its own gas extraction and its gas power plant fleet.

> *The expansion of the share of gas produced in-house in our procurement portfolio is also intended to further strengthen our position in the gas business. In doing so, Beta is consistently pursuing the path of integrating all stages of the value chain.*
> Management Report 2003, Beta

Thus, already during these first years within the liberalized German energy market, Beta solidified its path and established (what were at the time) successful patterns of action, from which the company would hardly deviate in the following decade.

Phase II (2004–2009). In the beginning of Phase II, Beta continued its growth strategy with a clear focus on realizing synergy and growth potentials through increasing the interconnections of its activities along the value chain. Indeed, in its 2004 Management Report, Beta highlighted that:

> *Horizontal integration between electricity and gas generates synergy and growth potentials from the convergence of the two energy sources, in particular through the increasingly important role of gas in electricity generation.*

While the further interlinkage of its activities provided substantial synergies and boosted the profitability of its businesses, it was though a pivotal milestone in its development that would later cost the company dearly. Thus, the synergy effects resulting from the combination of the businesses provided strong arguments to further expand them, which the company eagerly did in the upcoming years. However, Beta also undertook such a strategy after the market had already significantly changed, but more on that later.

As in late 2005, Beta faced a deteriorating situation that was particularly characterized by rising costs for fuel, energy procurement and emissions. The company responded by again resorting to proven recipes for success while investing in the further expansion of its gas extraction business.

> *The planned entry into new gas fields and the further expansion of our upstream activities should contribute significantly to achieving our strategic goal of securing a significant share of our gas requirements from our own production in the long term.*
>
> Management Report 2006, Beta

Thus, the company was able to counteract the rising costs for raw materials while further accelerating the synergies with its energy generation by gas power plants, which were actually lower in emissions compared to coal power plants, for example.

In 2006, Beta's growth offensive was initially slowed down as the European Competitive Commission forced the company to sell energy generation capacities in Germany in order to avoid it attaining a dominant market position. Thus, as one former Manager, Internal Consulting of Beta explained:

> *Beta became a pure energy company until at some point the European Competition Commission intervened. (…) Then it came to the situation that, among other things, some power plant capacities were sold.*

Beta took advantage of this situation and divested a large share of its coal power capacities, on the one hand because they were increasingly suffering from rising emission costs, and on the other hand because they offered little synergy potential with the company's own exploration business. From then on, Beta primarily concentrated on gas power plants in order to realize further synergy potentials and economies of scale. However, although Beta argued in its 2006 Management Report that *"economies of scale*

(...) are essential competitive advantages in the rapidly changing energy markets," it turned out that this was true only in the first place.

Indeed, the forced reduction of conventional energy generation capacities could have been seen as a welcome opportunity to change direction and refocus on renewable energies. At the time, the latter would have been a quite reasonable alternative because of their guaranteed feed-in remunerations compared to the increasingly dynamic and uncertain field of conventional energy generation. Although Beta seized the opportunity to enter the renewable energies business and even accelerated growth in the following years, this new form of energy generation was only considered as a supplement to its historically grown conventional energy generation business. Even today and under significantly changed framework conditions, Beta's primary focus remains on the conventional generation business. The chance that arose from this lucky coincidence was actually not grasped.

In 2007, Beta centralized its renewable energy activities to create a powerful basis for future growth: as its 2007 Management Report stated, *"our activities in the field of renewable energies and climate protection projects were centralized and are to be expanded worldwide."* To accelerate its expansion and to quickly build up its renewable energy capacities, Beta acquired shares in on- and offshore wind farms, bringing the company one step ahead of its competitors. Nevertheless, although Beta made a large step forward to increase the renewable energy share in its generation portfolio and thus decouple itself from the highly dynamic and uncertain market developments in the conventional generation business, even by the end of 2007 the company had abandoned its advantageous starting position.

Thus, at the end of 2007, Beta had completed its divestiture program, which provided the company with high sales proceeds. However, despite its former investments in renewable energies, Beta started a large-scale investment program in conventional energy generation at the beginning of 2008. One Division Head, Corporate M&A summarized the situation as follows:

> *And then the money had to be spent. Then (...) a massive, that is, an incredibly massive investment program was started, which ended in the fact that we built a very large number of new power plants, particularly gas power plants, and then the coal power plants started to be built.*

The ever-increasing relevance of climate-friendly energy generation that was supported by the German government's amendments to the Renewable Energy Sources Act and the introduction of CO2 certificates, which increased the production prices for high-emission energy generation, were further signals to reconsider the decisions made. However, Beta in fact felt that its prior decisions had been validated, as gas power plants were seen as one form of sustainable energy generation:

> *As one of the world's leading energy companies, it is our social duty to act as a role model in this important field* [of sustainability] *as well. That is why we have committed ourselves to reducing our specific CO2 emissions by 50 per cent between 1990 and 2030. To achieve this, we are investing billions in highly efficient, more climate-friendly power plants.*
>
> Management Report 2008, Beta

Furthermore, after a first significant decline in earnings, Beta was by no means questioning the future viability of its strategy, but rather adhered to its past recipes for success, that is, size and efficiency. Thus, in its 2008 Management Report, the company argued that *"size and a strong market position are an invaluable competitive advantage*

in the liberalized markets and at the same time the basis for a secure energy supply."

Further:

> *Our traditional strength is the conventional generation of energy. In this area, we are modernizing our power plant fleet in order to become more efficient and further expand our market share.*
> Management Report 2008, Beta

Indeed, as a consequence of the earnings decline, Beta tightened its investment criteria and guidelines, resulting in strict adherence to predefined structures, processes, and procedures. In its 2008 Management Report, Beta emphasized that *"in all our activities we focus on targeted investments and acquisitions according to strict strategic and financial criteria."* On the one hand, this led to the improved efficiency of the company's operations, but on the other hand, it progressively prevented those structures, processes and guidelines from being questioned.

Phase III (2009–2011). The decline in earnings from the previous years led Beta to rely even more on its proven recipes for success, namely efficiency and synergies through economies of scale and scope. In its 2009 Management Report, Beta highlighted one of its guiding principles, which had symbolized the company's development since market liberalization and would continue to shape its development until the present day: *"The more efficient we are, the more competitive are we."* Even in its renewable energies business, Beta was focused on applying this success formula. Thus, in its 2009 Management Report, the company emphasized that *"in the future, too, it is our clear objective to make the use of renewable energies even more economical by exploiting economies of scale."*

In 2010, Beta expanded its renewable energy portfolio by entering into the field of solar power generation, in which the company had identified significant growth and synergy potentials:

> *Large projects reduce costs and lead to economies of scale. So, after having successfully raised wind power to an industrial level, we are now turning to solar power and also expect enormous economies of scale.*
> Management Report 2010, Beta

However, Beta's large-scale investments in building up solar power capacities in 2010 were in fact the company's last noteworthy investments in renewable energies. After 2010, Beta focused even more intensively on its exploration and conventional generation business. Thereby, the company was guided by its core competencies, even though it was well-aware that the importance of renewable energies was accelerating, and that this new form of energy generation would play an ever more important role in the German energy market. Thus, according to one Division Head, Corporate M&A, *"one of our core competencies simply is the construction and operation of large-scale power plants. This is what we can do better than others."* Moreover, as one former Manager, Internal Consulting of Beta explained:

> *We thought, 'OK, that's us. Nobody can plan, build, operate and maintain power plants as well as we do, so we go in there and become the number one base load provider for Germany, while the others, they can all just look at our tail lights.'*

In this context, Beta's considerable efforts in the field of renewable energies were increasingly relegated to the back seat, as the company declared in its 2010 Management Report, *"we want to focus on what we do best and where we see the greatest opportunities for profitable growth."* Thereby, Beta established strict criteria concerning the expected profitability of any future investments, and increased the formalization of its processes of

identifying and evaluating potential investment opportunities. According to the company's 2010 Management Report:

> *Our expectations regarding these investments are high. All new projects, such as our new offshore wind farms or new gas power plants, must generate at least 1.5 percentage points more than the cost of capital.*

However, due to the fact that the same profitability criteria were set for renewable energy investments as for investments in conventional energy generation, even though the expected returns for conventional energy generation were based on the glory years of the past while the uncertain market development for coal and gas power plants was not taken into account, the criteria were impossible for renewable energies to meet. Thus, the established profitability threshold systematically excluded any further investment in renewable energies, especially as this threshold was increased further the following year.

Phase IV (2011–2015). After the nuclear phase-out decision of the German government and the corresponding energy turnaround, the financial pressure on Beta increased, as the company had to make significant value adjustments to its nuclear power plants. Moreover, the ongoing price decline of CO2 certificates led to the reduced profitability of gas power plants. As the financial resources available were now very limited, Beta again increased the profitability threshold for any further investments:

> *We are therefore relying on strict investment discipline and expect new growth projects, such as our planned offshore wind farms, to generate a return well above the cost of capital. This additional return requirement is generally 2.5 percentage points.*
>
> Management Report 2011, Beta

Thus, even though the market situation for renewable energies had become increasingly advantageous while a high level of uncertainty had shaped the market segment of

conventional energy generation, Beta still focused on expanding its conventional energy generation business. In order to calculate the profitability of conventional power plants, the company was blinded by the historical profitability of this type of energy generation, the achievement of which is almost implausible in any future scenario. As one former Manager, Internal Consulting admitted:

> *Some decisions were based on wishful thinking rather than on realistic assumptions. That is, those decisions were based on assumptions that made them look better.*

Although scenarios were formulated that also included a growing market share of energy generated by renewable sources, which would continuously increase the pressure on conventional energy generation, bad-case scenarios for Beta's gas and coal power plants were simply not believed or were even described as wrong or dubious.

> *Those are all assumptions on which the scenarios are based, and so every single point is vulnerable, and good news that you tell them is something that everyone wants to hear, but no one wants to hear bad news. As a consequence, they say, 'But this assumption is not true and what about that and so on.'*
> Division Head, Corporate M&A, Beta

At the time, one coal power plant was still under construction whose expected profitability was under review. However, despite the changing framework conditions for conventional energy generation and the increasing uncertainty with respect to this form of energy generation, the review came to have no consequences: the construction of the power plant was completed. As one former Manager, Internal Consulting emphasized:

> *At the time when the construction of the power plant was nearly completed, it had already become apparent that the power plant would not be profitable, but it was somehow pulled through anyway.*

In retrospect, this would also have been an obvious possibility to take a new direction, but Beta at this point was unable to restrain from its path. As one Division Head, Corporate M&A of Beta explained, *"once you have taken a certain direction, it is relatively difficult to say 'What I have been doing for the last few years was all wrong.'"* Further, referencing the situation, he claimed:

> *It would have been theoretically profitable according to the old plan, but due to the changes in the energy market with the massive expansion in renewable energies and the fact that prices had fallen, this power plant would not have covered its variable costs. (...) But now the thing is, what are they going to do with it? Well, a coal power plant, once it's under construction, then the thing is, yes, we wouldn't build it again, but (...) we can also finish it. So normally they would never turn away when they say we're almost finished, but we're closing the building anyway.*
> Division Head, Corporate M&A, Beta

In 2012, the framework conditions for conventional power plants still did not improve. Nevertheless, Beta made the decision to undertake further investments in its conventional energy generation business to improve the efficiency of its existing power plants and to further accelerate the expansion of its gas power plant capacities. As stated in its 2012 Management Report,

> *We are making significant investments in maintaining and expanding our conventional energy generation and gas infrastructure. In the coming year, we will invest in the expansion, replacement, and maintenance of power generation from coal, gas, and nuclear power. This includes, among other things, new fossil fuel power plant construction projects.*

Thereby, ongoing changes in the market were either not perceived or were discounted as irrelevant, according to one Division Head, Corporate M&A:

> *Only when you know that this is definitely the case, because everything has changed and there is no going back, then you actually have to act immediately, otherwise you have to show a certain stability.*

A ray of hope emerged at the end of 2012, as Beta decided to enter the field of energy-related services. Beta's strategic motivation was to become more independent from the regulated energy generation business and to develop a further revenue stream beyond its core business, which was under significant pressure. Thus, *"Beta was trying to establish energy management systems with various large corporations in order to escape from the regulated market,"* according to one former Manager, Internal Consulting. The company highlighted its strategic focus in its 2012 Management Report, stating that:

> *To make strategic co-investments in new companies with innovative business models or products in the future in order to integrate them into Beta's business. These are not purely financial investments, but rather strategic investments, with the aim of being pioneers in renewable, decentralized and other revolutionary energy solutions.*

However, already in 2013, the pressure on Beta's energy generation business further increased. The company had to make additional significant value adjustments that again compromised its financial situation and diminished its scope for new investments in more future-oriented areas. Beta was forced to initiate another major restructuring program of its conventional generation business, including fundamental cost reductions and efficiency improvement efforts.

> *Accordingly, our strategic focus is on the radical restructuring of the conventional generation business. This includes the cost-optimal alignment of all activities. (…) The unsatisfactory earnings contribution of our generation division (…) shows that there is an urgent need for action in this area. In this area, we will reduce costs and increase efficiency even more rigorously than before.*
>
> Management Report 2013, Beta

One part of Beta's restructuring program was an unprejudiced review of the economic viability of each individual power plant with the aim of shutting down all non-profitable power plants. However, even though a large number of gas power plants were identified

that no longer met the profitability criteria and should therefore have been shut down, the Federal Network Agency (FNA) rejected Beta's requests. The respective power plants were considered by the FNA to be systematically relevant. As a consequence, Beta was tied to loss-making assets, exacerbating the situation:

> *So, there are several gas power plants that Beta has registered with the Federal Network Agency to be mothballed, but the agency says, 'Sorry, you cannot shut them down yet.' So, you are now married to loss-making assets.*
> Former Manager, Internal Consulting, Beta

Nevertheless, Beta believed that the company was still well-positioned in a new energy world and should further focus on its existing core business of conventional energy generation. Thus, as written in the company's 2014 Management Report:

> *This new energy world will grow more dynamically (...) In addition, the traditional energy world will continue to exist and offer attractive opportunities to well-positioned energy companies. In the long term, it will remain indispensable for maintaining security of supply, so that there is no way around adequate remuneration for the provision of the necessary conventional power plants. (...) Through its focused positioning and consistent alignment, Beta can retain and further develop its key existing strengths and advantages.*

According to one former Manager, Internal Consulting of the company, *"the thinking at that time was, 'OK, now we hold our breath for a moment and after three years this will be over'"*. However, the outcome was different. In 2015, Beta found itself in a situation characterized by an extremely limited number of alternative options available and a lack of necessary financial resources to undertake any significant changes. Thus, one former Manager, Internal Consulting summarized that *"they* [the company] *just have very little breath air left at the moment."*

In conclusion, the case of Beta provides a classic example on how a company's development path may be solidified over nearly two decades and how available opportunities to change the development direction may be repeatedly refused by a continuous focus on existing businesses and competencies. Thus, despite Beta's early entry into the renewable energies business – as well as its later entry into the energy-related service business – the company's efforts to define a new strategic direction ultimately failed, as they were not pursued with the necessary intensity. Thus, the focus of the investments made by Beta remained at the core business of conventional energy generation. Even in a situation in which the company faced an ever-increasing financial pressure resulting from an obviously suffering core business, Beta was unable to perceive the eroding demand for its highly efficient, conventionally generated energy.

Instead of questioning the decisions it made, Beta blamed politics for its seemingly intractable situation: *"We must also take into consideration that Beta will continue to face high financial pressures in the coming years. This is the result of political decisions*" (2012 Management Report). In reality, Beta's own actions and omissions were the actual causes of its tense situation. Indeed, besides others it was mainly two factors that kept Beta on the same development trajectory. On the one hand, it was Beta's excessive focus on size and efficiency that repeatedly drove out more innovative solutions and new technologies, as returns on improving existing businesses, technologies, and competencies were more certain and closer in time: *"One also often falls back on things that one knows. The risk is also lower,"* as one Division Head, Corporate M&A of Beta summarized. Thus, particularly when confronted with change, Beta repeatedly resorted to its formerly proven recipes for success. On the other hand, it was Beta's failure to

perceive or acknowledge the changing circumstances due to its overconfidence in its own strength and market position that led it to repeatedly dismiss counterarguments or changes as irrelevant. This proved particularly problematic when the company ignored the increasing market uncertainty for conventional energy generation and the growing importance of renewable energies. One Division Head, Corporate M&A stated this issue concisely as follows:

> *There was always someone who told you that there would be a crash or something else, but those were no serious assessments. So, it was unpredictable in the end that renewable energies were promoted to such a great extent.*

5.2. GROUP B: NEWCOMERS' LOCK-IN

Group B contains two small to medium-sized regional utilities (Gamma and Delta) that entered the liberalized energy market without their own energy generation capacities, whether conventional or renewable. Similar to Alpha and Beta, the development of the two companies in group B was affected by stabilizing dynamics that prevented them from entering new development paths. Rather, both focal firms stuck to their once entered path of development, leading them into a strategic lock-in.

5.2.1. THE CASE OF GAMMA

Compared to the abovementioned cases of Alpha and Beta, Gamma is a small to medium-sized regional utility company. While at the time of the market liberalization in 1999 Gamma did not possess any conventional or renewable energy generation capacities, it

soon undertook large-scale investments in both forms of energy generation – conventional power plants and renewable energies – as outlined in Figure 6. Gamma was one of the pioneer firms investing in the field of renewable energies. Accordingly, one might assume that Gamma belongs to the winners of the market transformation. However, there was one major issue with Gamma's remarkably large investments in renewable energies.

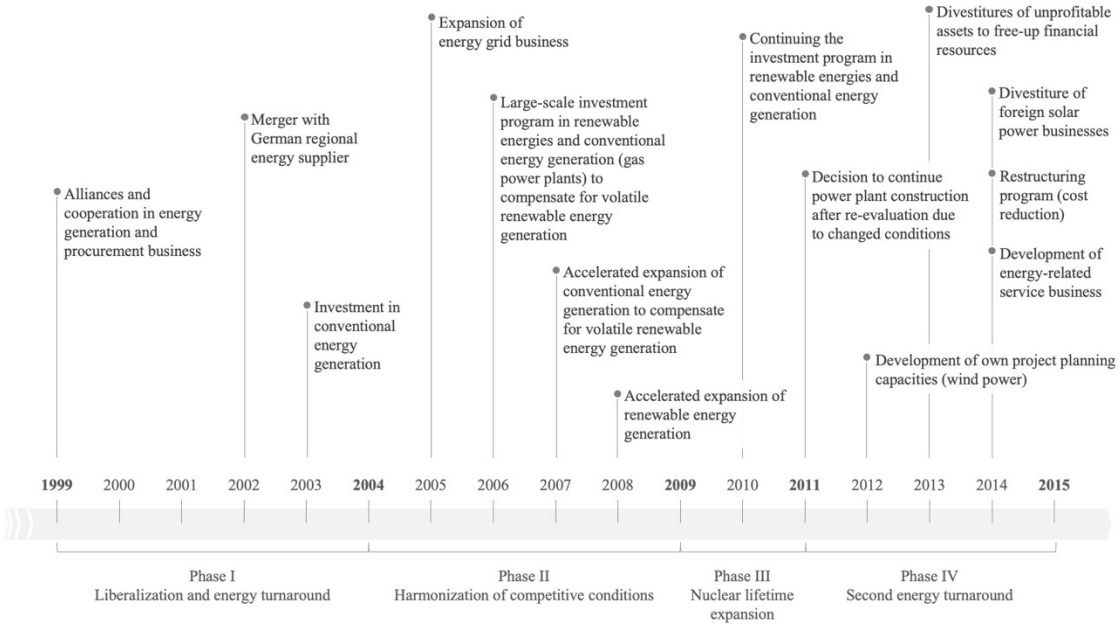

Figure 6: Key Milestones in the Development of Gamma

Gamma applied the competencies it learned in the conventional energy business to new energy generation technologies and thereby mainly focused on those forms of renewable energy that are able to produce large capacities of energy, that is, offshore wind farms. Although Gamma was one of the first to invest in the construction of offshore wind farms,

their construction period – and particularly considering the state of the technology at the time – was so time-consuming that even by 2015 they had not been completed. Thus, despite Gamma's large investments in renewable energy capacities, the capacities the company had built up at the end of Phase IV were not sufficient to compensate for the losses of the company's gas power plants. Thus, Gamma suffered significant losses.

Phase I (1999–2004). In Phase I, Gamma quickly recognized that the new liberalized energy market would soon be dominated by large-scale market participants. Thus, in 2000 it entered into cooperation with other small to medium-sized regional utility companies in order to realize scale economies. While following this path of becoming a larger utility company, Gamma even merged with another medium-sized energy supplier in 2002. As stated in Gamma's 2002 Management Report, *"the merger will create important synergy effects."*

Gamma's focus on size and on achieving scale economies decisively guided its fate in the following years. Indeed, these criteria had a major influence on Gamma's early decision to enter the energy generation business and to build up its own energy generation capacities. As the CEO of Gamma argued:

> *At the time shortly after the market liberalization, size was the key driver in the development of nearly all market participants. Our large-scale investment program in coal and gas power was also truly motivated by size and thus by achieving economies of scale.*

Phase II (2004–2009). In the second phase after the liberalization of the German energy market, Gamma intensified its expansion of energy generation capacities. Thereby, Gamma undertook large-scale investments in the development of its own generation capacities. What is noteworthy at this point is that Gamma not only focused on

conventional energy generation, which still was the dominant form of energy generation at that time, but rather recognized the increasing importance and future potential of renewable energies. Thus, driven by a political aspiration to strengthen its position against multinational utility companies, Gamma accelerated the expansion of its energy generation capacities. One Senior Manager, Business Development of Gamma explained the situation as follows:

> *Then, there was a mood in the political arena that one should do something against the Big Four* [i.e., the four largest German utility companies]. *And for this reason, generation capacities were built up, especially by municipal companies. (...) And in this context, however, we placed the emphasis on renewable energies.*

Thus, Gamma initiated a large-scale investment program in renewable energies that began with an investment in a major offshore wind power project in 2006 and included further investments over the next five years. Gamma's focus on such a major project was again driven by the company's emphasis on size and on achieving economies of scale. Accordingly, one Manager, Group Controlling of Gamma stressed that:

> *Our major wind energy project with which we have entered the renewable energies business was driven by the expertise that we had already acquired in developing large-scale conventional power generation projects.*

Indeed, the framework conditions for renewable energies were highly beneficial, as politics had created a stable and plannable sub-segment within the energy generation market. Therefore, remunerations were guaranteed for renewable energies, while in the conventional energy generation business, frequent political interventions created dynamic and uncertain framework conditions.

> *Purely renewable energies have been relieved of risks, in so far as they have received guaranteed purchase prices. In other words, the investments could have been very well-calculated.*
> Senior Manager, Business Development, Gamma

Nevertheless, besides renewable energies, Gamma still adhered to conventional energy generation, in particular to gas power plants. Certainly, the company argued that modern gas power plants were a necessary and environmentally friendly complementary source of energy generation to renewable energies.

> *So, wind is so to speak our primary source of energy generation now. And as a complement to this volatile form of energy generation, flexible, low-CO2 power plants are needed, so gas power plants are exactly the right thing.*
> Senior Manager, Business Development, Gamma

In 2007, Gamma divested unprofitable and non-strategically investments and reinvested the freed-up financial resources in its energy generation business. Gamma provided substantial financial resources to further accelerate its investment program in climate-friendly energy generation. However, the company's interpretation of climate-friendly energy generation was broadly formulated. For Gamma, climate-friendly energy generation did not exclusively include renewable energies, but also gas power plants that were seen as a future-oriented source of energy generation. As written in the company's 2007 Management Report,

> *Access to generation capacities will increasingly become a key issue for the future of the energy supply industry (...). In this context, Gamma will place its strategic focus on modern power plant technology in view of its corporate responsibility for the climate and the environment.*

Moreover, as a consequence,

> *At least two thirds of our budget went to gas power plants, because we knew that flexibility would be important in the future. In other words, flexibility means no lengthy ramp-up of power plants.*
> Senior Manager, Business Development, Gamma

The investment decisions were highly driven by economic criteria: *"There is simply this ordinal system, that is, categorically whoever brings a better IRR, wins. We also have internal cost rates, which the whole company has to follow"* (Senior Manager, Business Development of Gamma). Moreover, as the CEO of Gamma highlighted, *"based on the expected ROI and IRR,* [conventional] *generation was identified as a lucrative business area."* Thus, in this context, only large-scale energy generation projects – either renewable or conventional – were taken into consideration, while decentralized and small-scale renewable energy projects tended to be neglected, with far-reaching consequences.

Already in 2008, the situation for conventional energy generation became more and more difficult, particularly due to the increasing proportion of renewable energies that entered the market and as a consequence, led to the decreasing profitability of conventional power plants. Instead of concentrating on its renewable energies business – which in retrospect would have been much more advantageous – Gamma tried to actively influence the political debate in favor of conventional energy generation, but with only moderate success:

> *The political discourse with respect to the decisive issues of the energy industry is set at both the European and the national level. This is why we have organized ourselves jointly in a cooperation of the leading municipal utilities. Together we represent about ten per cent of the German energy market and we make our voice heard at the federal level on important energy policy issues.*
> Management Report 2008, Gamma

Phase III (2009–2011). In Phase III, Gamma further continued its investment program to boost its energy generation capacities. In the field of renewable energies, Gamma invested in a decentralized wind project as well as a large-scale onshore wind farm. However, Gamma also undertook another major investment in conventional energy generation to build a new gas power plant. Similar to its former investments in conventional energy generation, Gamma argued that this gas power plant would be a necessary supplement to its renewable energy generation:

> *We are currently constructing a gas turbine plant that will feed electricity into the grid as so-called balancing power, which can compensate for fluctuations in energy production from the wind or the sun within a few minutes. This is a necessary additional supplement to renewable energies. Plants of this type are the real bridges to renewable energies.*
> Management Report 2010, Gamma

However, as this gas power plant could only be commissioned in 2012 at the earliest, the investment soon became a massive burden for the company.

Phase IV (2011–2015). Shortly after the core meltdown in the nuclear power plant in Fukushima, the German government made the decision to initiate an energy turnaround, including a nuclear phase-out and a focus on renewable energies. In this context, Gamma initially felt that its strategy had been confirmed. According to one Senior Manager, Business Development of Gamma:

> *It has been said that we are counting on the energy turnaround and that these gas power plants are now being used as a complementary energy generation technology to the volatile energy generation from renewable energies.*

However, due to a constantly increasing proportion of renewable energies and an ongoing price erosion for emission certificates, the situation for conventional energies became

increasingly challenging. Therefore, particularly gas power plants suffered profitability declines. For Gamma, the question arose of whether the construction of the gas power plant that was initiated in 2010 should now be continued under these changed premises? However, despite the increasing dynamic and the growing uncertainty in the German energy market, particularly with respect to the future of fossil fueled power plants, Gamma decided to complete the construction of its gas power plant. No credence was given to the negative investment cases for gas power plants. As one Manager, Group Controlling highlighted, *"the way of thinking at that time was that conventional power plants have always paid off in the past and this would not be any different this time either."*

Indeed, shortly after the decision was made, the situation again deteriorated for Gamma. The profitability of gas power plants further declined, while the earnings generated from the renewable energies business could not compensate for the losses in the conventional generation business, particularly as the commissioning of the major offshore wind farm was repeatedly delayed. Gamma increasingly came under pressure, but still adhered to its two-track strategy in the energy generation business. Gamma did not recognize the need to pull the ripcord in the conventional generation business. Instead, to cope with the situation, Gamma focused on further efficiency improvements and cost reductions in its conventional energy generation business:

> *The altered framework conditions and the price development on the electricity market as well as the sharp price decrease of emission certificates have a significant impact on the profitability of investments already made and on long-term contracts. Gamma is meeting these challenges by consistently tapping efficiency improvement and cost-cutting potential.*
>
> Management Report 2012, Gamma

To accelerate the expansion of decentralized wind projects – the only remaining profitable business at the time – Gamma acquired a wind project developer that provided preferential access to new locations for the installation of wind turbines. As one Senior Manager, Business Development of Gamma explained:

> *We have decided not only to generate our own wind energy, so to speak, but also to project it ourselves for the expansion. In the meantime, we have now expanded the depth of added value and have our own project planning team, which will gradually increase our capacities in the future.*

This investment was strategically important as it provided a basis for future growth in the decentralized renewable energy production, but retrospectively, it came too late. The acquisition of the project developer would have required continuous subsequent investments in order to deploy its competencies, as the Senior Manager, Business Development of Gamma further elaborated:

> *In other words, when it comes to investments, the question is, where have we already built up structures that constantly need lubricants, so we basically have a wind project developer here that creates value, but of course it always needs capital in order to put all the wind turbines here (…), so the budgets that remain go in that direction.*

However, Gamma was already in a distinctly tense situation at that time, in which the necessary financial resources were no longer available. As a consequence, the company was not able to make any further investments in wind projects.

In 2013, Gamma's problems with its conventional energy generation capacities once again intensified: *"The gas power plants are our problem children at the moment so to speak, as they cannot operate economically"* (Senior Manager, Business Development). After repeated delays, the construction of Gamma's new gas power plant was now completed. Whereas in 2011 the company had been determined to complete the

construction, it now had to pay dearly for its decision. According to one Senior Manager, Business Development:

> *So, the decision has been made, the power plant was built and already at the time of the commissioning it became clear that the power plant (...) could not be operated economically, neither today nor in the future.*

Again, Gamma had to make massive value adjustments, which significantly burdened the company's earnings, as outlined in the company's 2013 Management Report:

> *Value adjustments of this magnitude are always very burdensome for companies. For us in particular, as an almost 100 per cent municipal company, such value adjustments are extremely hard to cope with.*

As a consequence, Gamma divested unprofitable assets to free up financial resources, and conducted efficiency improvement measures in all business segments:

> *Measures to increase efficiency were defined in all business segments, for example by (...) streamlining the product and asset portfolios through divesting unprofitable assets and lowering internal service levels.*
> Management Report 2013, Gamma

However, as those measures were no longer sufficient to improve the financial situation, Gamma was forced to undertake a large-scale restructuring program in 2014, even including the divestiture of profitable renewable energy projects. As this was one of the few options remaining for Gamma, the company then entered the less capital-intensive business of energy-related services. Thus, as one Manager, Group Controlling claimed, *"only in 2014, we decided to develop the energy-related services business segment."* Finally, another delay in the commissioning of Gamma's offshore wind farm again hit the company hard and resulted in a double-digit millions loss at the end of the year 2014.

Thus, in conclusion, the decisions made over the years led Gamma into a challenging situation at the end of the observation period, in which little scope for action was left. The company recognized that in the area of renewable energies, there was an overly strong concentration of resources within a single investment – an offshore wind farm – a mistake that the company was determined not to repeat. Instead, Gamma committed to focus on diversification rather than on achieving synergy potentials and cost degression, at least in the renewable energies business. According to one Senior Manager, Business Development of Gamma:

> *With our major* [renewable energy] *project a strong concentration of resources took place. At the moment we are also saying that we do not want to have another offshore wind project of this size due to diversification, so that you can be somewhat variable in your portfolio, that is, the composition of your assets.*

However, with respect to conventional energy generation, in which an even stronger concentration of resources in gas power plants has taken place, the company does not accept its former over-emphasis on achieving synergy potentials and cost degression. Rather, Gamma is accusing politicians of making economically and ecologically inappropriate decisions:

> *But at the moment the state is misusing its power or its power to shape things to such an extent that it is even punishing companies that have built their assets* [that is, their conventional power plants] *for bottleneck situations. We have provided something useful for the general public. So, this is absolutely absurd.*
>
> Senior Manager, Business Development, Gamma

5.2.2. THE CASE OF DELTA

Like Gamma, Delta is a small to medium-sized regional utility company. At the time of the market liberalization in 1999, Delta did not possess any energy generation capacities, neither conventional power plants nor renewable energy. However, as Figure 7 outlines, the development of Delta in the years after the market liberalization was particularly characterized by large investments in building up its own conventional energy generation capacities. Thereby, Delta mainly focused on coal power plants, which soon became the company's major source of energy generation, but ultimately also its major weakness and Achilles' heel due to a significant decrease in productivity.

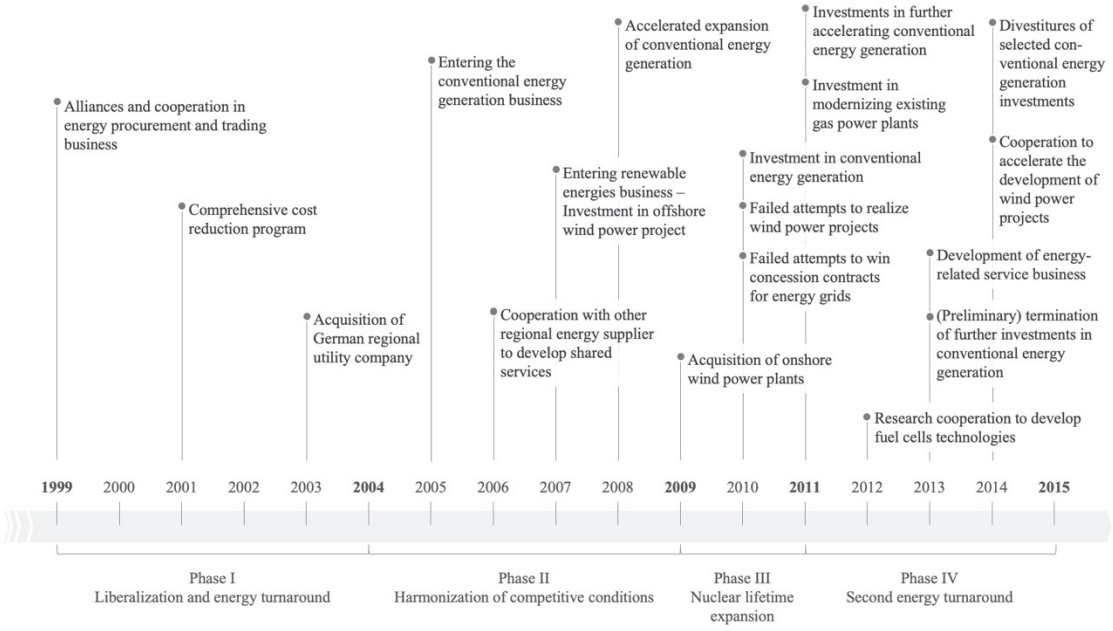

Figure 7: Key Milestones in the Development of Delta

Phase I (1999–2004). In Phase I, soon after the market liberalization, Delta declared in its 2000 Management Report that *"our future vision is to generate a growing part of our sales with services for other companies."* Whereas in retrospect, following those plans would have marked a true success story in the German energy market, unfortunately Delta's target could never be accomplished. Instead, Delta took a fundamentally different development. Thus, the years between 1999 and 2004 were characterized by major initiatives that have shaped the development of Delta even until today.

Due to the market liberalization, energy companies that had grown up in a nearly monopolistic market environment were suddenly confronted with significant price decreases. To cope with this new situation, Delta entered into alliances and cooperation with other small to medium-sized regional utility companies in order to expand. According to one Senior Manager, Business Development, *"relatively early on, we tried to develop ourselves further through cooperation."* Thus, alliances and cooperation were mainly focused on energy procurement and trading in the first stage. Furthermore, Delta sought to become more efficient in its entire processes, which were still shaped by the pre-liberalization era. As stated in Delta's Management Report 2001,

> *Due to the further liberalization of the energy markets, the market environment will continue to be characterized by price and sales risks. These market risks are countered by consistent cost management.*

Consequently, this efficiency focus soon found its way into Delta's DNA and drove the development of the company with respect to its subsequent decisions, even today.

Phase II (2004–2009). In 2005, Delta made a far-reaching step while entering its path of conventional energy generation. Specifically, Delta's large investment in a gas power plant was not only driven by its management, but also by its shareholder:

> *After all, we are in municipal hands, that is, we are politically driven. And at the time, the wish of the politicians was clearly formulated: Go into conventional generation!*
> Senior Manager, Business Development, Delta

Nevertheless, Delta's management was also convinced that investing in conventional energy generation would provide a great opportunity for the company to move forward, as it would reduce its purchasing costs as long as the development of conventional power plants remained as stable as it had in previous decades. Thus, the management argued that:

> *For a medium-sized municipal utility like us, it was clear that in the long run, we would not get out of the 'stranglehold' and if we did not want to be and become completely dependent, we would have to have our own generation capacities: that was the idea at the time.*
> Senior Manager, Business Development, Delta

Furthermore, Delta's management was impressed by the success stories of market incumbents (i.e., multinational utilities like Alpha and Beta) and wanted to emulate those (at the time) prosperous companies. One Senior Manager, Business Development explained the situation as follows:

> *The motivation of the colleagues who decided* [to invest in conventional energy generation] *at that time was mainly driven by the fact that they wanted to get a slice of the cake themselves.*

At the time Delta entered the conventional energy generation business, the company was already planning to further expand in the upcoming years. Therefore, the company

established strict processes and procedures that standardized the evaluation of investment opportunities and streamlined the process of selecting profitable investments. As claimed in its Management Report 2005, *"Delta applies a strict guideline for the implementation and assessment of the profitability of investments."* Again, through the adoption of standardized processes and binding investment criteria, Delta was able to achieve further efficiency gains.

In 2007, Delta recognized an investment opportunity that promised significant returns, and which became the company's ticket to enter the renewable energies business. The company undertook a large investment in an offshore wind farm, to be built by a cooperation of multiple small and medium-sized utility companies. Crucially, however, Delta at that time was less focused on entering the renewable energies business. Rather, the company's focus was on high expected returns on the one hand – as one Senior Manager, Business Development of Delta explained, *"expected returns on investment dominate very strongly*" – and on gaining access to significant energy generation capacities on the other. The latter in particular drove Delta's development in the following years.

Although in its 2001 Management Report, Delta had already recognized the growing importance of renewable energies – stating that *"due to the high minimum remuneration, the dynamic market growth of renewable energies should continue at least until 2010"* – and despite its large-scale investment in the offshore wind farm, particularly in 2008, the company discounted the accelerated and ongoing market shift toward decentralized renewable energies. As one Senior Manager, Business Development of Delta highlighted, *"no, there have been no signals, not at all."* He further stated that, at the time, *"the energy*

industry was totally boring, everything runs on one track and always goes in one direction only. So, I really believe that probably nobody foresaw that 10 years ago." Delta was focused on building up large energy generation capacities, widely regarded as easiest to achieve via coal and gas power plants.

As a consequence, Delta invested in a coal power plant in 2008. The investment decision was mainly driven by three factors that had guided the company's investment decisions in previous years: Economies of scale, existing competencies, and again, a strict profitability threshold for its investments. Thus, instead of focusing on increasingly important decentralized forms of energy generation, Delta aimed to achieve scale economies and cost degression in the energy generation business.

> *We were focused on large-scale power plants with high energy generation capacities. As we have to serve a great number of customers, we cannot generate the energy required by using a few wind turbines.*
> Senior Manager, Business Development, Delta

Moreover, the company decided to concentrate on activities in which it already had competencies and expertise. Thus, as one Senior Manager, Business Development of Delta concluded:

> *The criterion of investing in conventional energies, because there is a certain amount of expertise in this area, also played a role, but it has to be said that the overall level of expertise in renewable energies was simply not that high.*

Finally, due to the company's strict and binding investment criteria, alternative forms of energy generation were hardly taken into consideration. Indeed, one Senior Manager, Business Development of Delta argued that *"at that time, we could not have foreseen that we would be able to meet the expected returns by investing in renewable energies."*

Emerging counterarguments highlighting the manifold alterations of the framework conditions for the conventional energy generation business, for example the introduction of CO2 certificates and the various amendments to the Renewable Energy Sources Act, all at the expense of conventional energies and in favor of renewable energies, were simply suppressed.

> *Nobody dared to say that renewable energies would at some point push so massively into the market that they would completely destroy the wholesale prices for electricity.*
>
> Senior Manager, Business Development, Delta

Phase III (2009–2011). In Phase III, the situation became more and more dynamic. In particular, the future of conventional energy generation became increasingly uncertain due to a growing proportion of renewable energy capacities in the market. Nevertheless, Delta still believed in its planning scenarios regarding its conventional power plants. Certainly, one Senior Manager, Business Development at Delta acknowledged that *"you can't simply say, 'all or nothing,' but you have to make certain assumptions and it is clear that some of those assumptions were certainly too optimistic*." The company thereby largely ignored the fact that investments in conventional power plants are oriented toward the long term, and particularly in a market characterized by a high level of dynamism and uncertainty, they could not be reliably planned. In retrospect, the consequence should have been to make realistic assumptions about the future of energy generation taking into consideration the high level uncertainty instead of understanding assumptions as objective knowledge. Thus, Delta should have turned away from the protracted development of large conventional generation capacities and instead focused on

decentralized energy generation through renewable energies, for which the framework conditions were stable and could have been realized more quickly.

Although Delta made efforts to gain a foothold in decentralized renewable energy generation, the company was repeatedly slowed down both internally and externally. On the one hand, Delta's formalized and standardized evaluation processes regularly precluded many investment opportunities even at an early stage as they did not meet the expected investment criteria. Thus, in its 2009 Management Report the company emphasized:

> *These risks are minimized by extensive preventive measures, including an always careful and strategy-based examination and selection of relevant projects, comprehensive investment and project controlling, and strict compliance with investment guidelines.*

On the other hand, various attempts to install wind power plants failed due to a lack of public acceptance. One Senior Manager, Business Development of Delta described the situation as follows:

> *Well, we had once planned to invest in wind energy in our supply area, but that was beaten us round the heads. So, the fact that there is not a single large wind energy producer here is due to the proverbial headwind. (...) I think when you leave the cities, people don't want that* [wind turbines] *because it spoils the landscape. The argument is, 'You don't have to fill up that little bit of green that we have here,' thus, nobody wants it on their doorstep.*

As a consequence, Delta again turned away from further investments in renewable energies, and instead accelerated the expansion of its conventional energy generation capacities. In cooperation with other municipal utility companies, Delta acquired a majority stake in one of the largest fossil fuel-based energy producers in Germany in 2010. As the company highlighted in its 2010 Management Report,

> *The consortium will thus become the largest municipal generation platform in the conventional energy sector in Germany. The acquisition thus not only serves to strengthen the business of the municipal utility partners within the consortium, but also secures them access to their own, high-performance generation capacities. The consortium aims to further accelerate ecological expansion and transformation. This includes investments in the (...) construction of more environmentally friendly gas and steam power plants.*

Phase IV (2011–2015). In Phase IV, soon after the acquisition of the conventional energy producer, the construction of a new coal power plant was initiated. Moreover, Delta invested large amounts in modernizing its own gas power plant. However, due to the nuclear accident in Japan and the following nuclear phase-out in Germany, the economic conditions for conventional generation again dramatically changed. Renewable energies soon became the preferred form of energy generation, while conventional power plants were relegated to a mere back-up solution. As a consequence, Delta had to make significant value adjustments in its conventional power plants, putting the company under massive financial pressure.

However, instead of pulling the emergency breaks, Delta stuck to its proven recipes for success while arguing that:

> *A nationwide electricity supply based on existing renewable energy plants alone cannot be guaranteed at present. Conventional power plants are extremely important for the security of energy supply, especially in times of bottlenecks or when renewable energy plants fail to generate electricity.*
> Management Report 2012, Delta

Rather than questioning the future viability of conventional energy generation, the company thus focused on efficiency improvements at its gas and coal power plants. As stated in its 2012 Management Report:

> *The political developments following the natural and reactor catastrophe in Japan show that the risk of rapid changes in energy policy has grown. Increased regulatory interventions in the energy market also bear earnings risks that are countered by consistent cost management.*

As Delta suffered from a financially tense situation in 2013, limiting its options, it was forced to move into less capital-intensive business areas. Thus, the company entered the energy-related services business. However, given that key competitors had already entered this promising business area (and with a clear strategic focus) many years before, this step represented just a small ray of hope for Delta.

Any further investments in conventional energy generation were terminated, but with respect to its existing generation capacities, Delta still believed in the future prosperity of its conventional power plants and therefore again resorted to efficiency improvement measures to cope with this challenging situation. According to its 2014 Management Report:

> *The framework conditions for coal power plants remain a challenge, especially due to the rapid expansion and the feed-in priority of renewable energies. Delta is well-positioned through efficient power plant operations (…). In order to avoid losing attractiveness despite the difficult framework conditions for the entire energy industry in Germany, Delta will further optimize its generation portfolio and diversify it. For this purpose, the company will use all opportunities to ensure that existing power plant capacities will continue to be operated economically in the future.*

To free up financial resources and generate cash, Delta was compelled to divest selected conventional energy generation investments in 2014. In order to compensate for the losses in its conventional energy business, Delta attempted to realize further wind energy projects and therefore entered into cooperation with a regional wind project developer. However, at the time it was becoming harder and harder to find appropriate locations.

Delta then suffered another setback. After repeated delays in commissioning, it was realized in 2015 that the offshore wind farm in which the company had already invested in 2007 and that had been regarded as Delta's sheet anchor could not be completed. This had a further considerable impact on the company's financial situation as it was no longer possible to compensate for the losses it had experienced in the conventional generation business. Instead, further value adjustments had to be made, even for this formerly auspicious renewable energy project.

In conclusion, Delta's decisions in the years since the market liberalization have led the company into a challenging situation at the end of the observation period. One Senior Manager, Business Development of Delta claimed, *"we entered – as we have to admit today – too massively into conventional energy generation."* Consequently, Delta on the one hand must deal with productivity losses at its conventional energy generation units, and on the other lacks the necessary financial resources to correct its previous decisions. As one Senior Manager, Business Development of Delta explained:

> *We do have massive issues with so many of our projects and of course, the money is not as easy to spend as it was five years ago. (…) We are talking about major projects in conventional energy generation. You can see in the newspapers every day that the power plant market is no fun at all at the moment. Because we said 'Yes, we'll take that with us' in so many places at the time, we have a lot of problems now: most things are just not as much fun right now.*

Thus, the range of available options is clearly limited for Delta. However, this does not necessarily imply that there is no potential for organizational adaptation. Rather, the major issue is that Delta seems to be afraid of repeating past failures. Delta wants to learn from these lessons, in turn preventing it from grasping available opportunities and hence undertaking strategic change.

> *The knowledge gained in the past has a massive influence on today's investment decisions. On the one hand, of course, there is considerably less money, because we have to fight massively against the issues arising from our conventional energy generation projects. Our investment guidelines have become stricter and our Supervisory Board has become much more cautious. This means that the Supervisory Board also rejects projects that it considers safe, for example (…) an onshore wind project. Then it says, 'First of all, make sure you get the other projects back on track.' Although it has to be said that it would be smart to invest in this field right now, our Supervisory Board has become very restrictive.*
>
> Senior Manager, Business Development, Delta

5.3. GROUP C: UNLOCKING A DEVELOPMENT PATH

Similar to group B, group C contains two small to medium-sized regional utilities that entered the liberalized energy market without energy generation capacities. However, conversely to Alpha, Beta, Gamma and Delta, Epsilon and Zeta were able to overcome the influence of stabilizing dynamics and unlocked their once entered development paths. Both focal firms successfully reallocated resources to new businesses and technologies despite the strong economic, organizational and social forces at play.

5.3.1. THE CASE OF EPSILON

In line with the aforementioned cases of Gamma and Delta, Epsilon is a small to medium-sized regional utility company that at the time of the market liberalization did not possess any energy generation capacities, neither conventional nor renewable energy. Although Epsilon soon began to build up its own capacities in conventional energy generation and even accelerated the expansion of its conventional energy generation business in the following years, it perceived an ongoing shift in the framework conditions for this form

of energy generation. Consequently, it undertook a major strategic realignment toward renewable energies, which eventually became the focus of its generation strategy. Moreover, as Epsilon perceived further changes in the framework conditions for renewable energies almost three years later, the company again adapted its strategy to become a service-oriented utility company. Figure 8 outlines the key milestones in the development of Epsilon since the market liberalization in 1999.

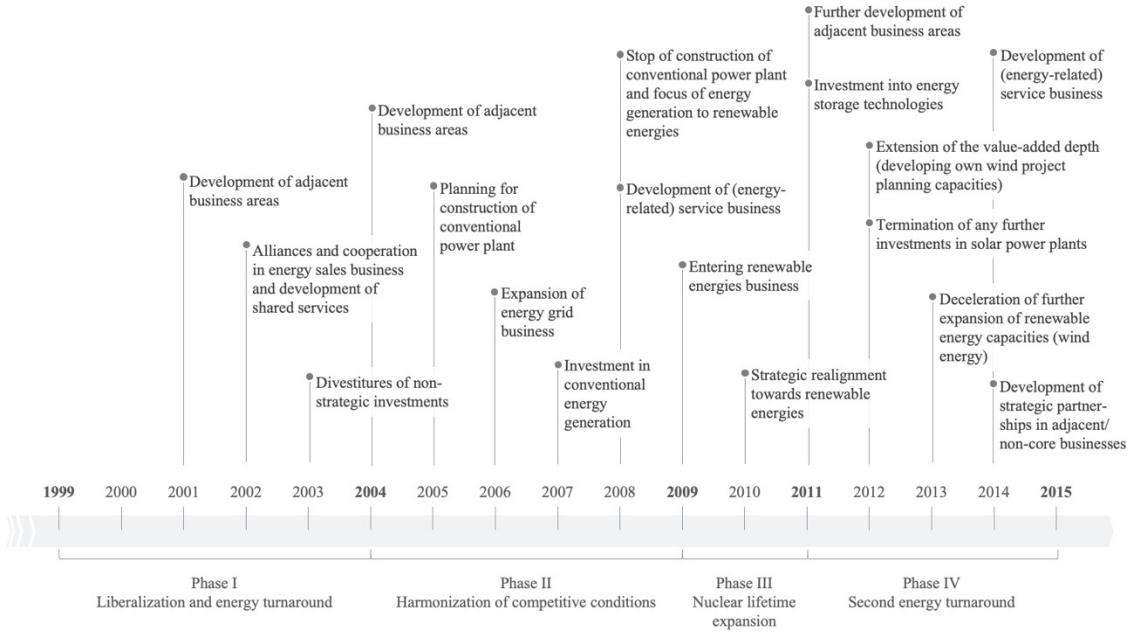

Figure 8: Key Milestones in the Development of Epsilon

Thus, in contrast to the cases of Alpha, Beta, Gamma and Delta, Epsilon has proved its ability to undertake organizational adaptation and to alter its development path, even in a context in which there were strong arguments to continue with the former strategy. Having divested its critical assets in conventional energy generation at an early stage and

constantly developed new profitable and future-oriented business areas, Epsilon is now in a much more comfortable situation than its counterparts. Accordingly, Epsilon is clearly one of the winners of this market development.

Phase I (1999–2004). In Phase I, after the market liberalization took place and forced the market participants to become entrepreneurial, Epsilon soon broke with established ways of thinking and acting like a monopolistic energy supplier by refocusing on the development of additional value-added business areas. Thus, according to the company's 2001 Management Report, *"growth opportunities as a network operator primarily lie in product market segments such as building land development and energy contracting."* Furthermore, *"the intensified development and marketing of network products should help us to develop additional value-added areas."*

In 2002, Epsilon entered into alliances and cooperation with other small to medium-sized regional utility companies. Although such a strategy of alliances and cooperation was pursued by many regional utility companies at the time, Epsilon's followed a different logic. Specifically, Epsilon was not primarily focused on increasing its size and achieving scale economies, but rather on realizing synergy potentials due to shared resources and competencies between partners. Indeed, according to the company' 2002 Management Report, *"the alliance enables its partners to generate synergy effects in the fields of accounting, information technology and customer service (call center)."*

In this context, Epsilon undertook another important step with a major influence on the company's further development in the liberalized energy market. Instead of centralizing activities and thereby improving control, Epsilon decentralized its activities while putting

a strong emphasis on flexibility, even in an early phase of the liberalized energy market, in which nearly all market participants regarded size and control as key success factors. Thus, in contrast to the prevailing opinion, Epsilon stressed that:

> *This is a further step on the way to becoming a company group that meets the demands of competition with powerful, flexible organizational units that are focused on their respective core business.*
> Management Report 2002, Epsilon

In 2003, a further factor emerged that helped Epsilon to achieve success thereafter. At an early stage and with a clearly strategic motivation, Epsilon began evaluating its investments with respect to their coherence and consistency with the company's strategic direction. Thus, in its 2003 Management Report, Epsilon declared that:

> *Within the framework of evaluating the individual shareholdings, the Executive Board is of the opinion that a further shareholding in those companies is not part of the strategic business areas, and has offered the co-shareholders the shares for sale.*

In this way, perceiving changes in the market and flexibly acting on them quickly became key drivers and success factors for Epsilon's further development in an increasingly uncertain and ambiguous market environment – up to now.

Phase II (2004–2009). In Phase II, Epsilon continued its search for adjacent and valuable business areas, a strategy already initiated in 2001. Then in 2005, the company made a decisive step by entering the conventional energy generation business. Thereby, Epsilon followed the prevalent opinion of nearly the entire industry, deciding to build its own coal power plant:

> *Utility companies are well-advised to invest in the energy generation business in addition to energy grid operations. Our planned coal power plant is therefore much more than just a reasonable option. For strategic reasons, it is essential to pay the greatest attention to our own energy generation.*
>
> Management Report 2005, Epsilon

According to the CEO, *"there was a kind of gold rush in the energy generation business. History has shown that you can print money with conventional power plants."* In its 2005 Management Report, Epsilon further argued that *"the planned construction of a new coal power plant should also secure our district heating supply from cogeneration production in future."*

In the following years, Epsilon continued to place a strong emphasis on conventional energy generation and thus made further investments in this area. As documented in the company's 2007 Management Report:

> *We continue to attach great importance to municipal conventional energy generation (...). For this reason, we have increased our stake in an operator of conventional power plants.*

Although at the end of 2007, conventional energy generation undoubtedly remained the preferred form of energy generation among most of the market participants, Epsilon's confidence in conventional energy generation was slowly eroding, as the company's supervisory board changed its position with respect to the construction of Epsilon's new coal power plant.

> *Surprisingly for us, the city council has fundamentally revised its position on the construction of a coal power plant and is now opposed to its construction by a very narrow majority, after the project has been supported by a clear majority since 2006.*
>
> Management Report 2007, Epsilon

In retrospect, this was a lucky coincidence, even though, Epsilon did not completely give up this form of energy generation at this point.

Given that the level of market dynamism and uncertainty significantly increased in the German energy market due to political interventions, changing consumer behavior, and particularly technological advancement in the field of renewable energies, Epsilon established the necessary structures and processes to enable the company to perceive these ongoing changes and act on them, that is, to maintain its flexibility and adaptability. Indeed, in its 2008 Management Report, the company stressed that:

> *Every employee is obligated to communicate identified risks to the respective manager. Appropriate mechanisms are in place to ensure that the information is passed on to the management.*
> Management Report 2008, Epsilon

These efforts should bear fruit in the future.

Phase III (2009–2011). The years between 2009 and 2011 had a significant impact on Epsilon's development, as in these years, the company turned its energy generation strategy by 180 degrees. Moreover, again luck played a certain role. As an effect of the worldwide financial crisis in 2008, one of the mandated banks withdrew from financing Epsilon's power plant due to an adaptation of its internal lending guidelines. As Epsilon stressed in its 2008 Management Report:

> *Due to the effects of the financial market crisis, one of the mandated banks withdrew from financing the coal power plant project. The withdrawal was based on the bank's new internal guidelines not to finance any major long-term construction projects. Although the profitability of the project is also confirmed by the concerned bank, Epsilon has decided to suspend the project before entering the second construction phase.*

At this point it would have been advantageous to search for other financing partners and continue along the path of conventional energy generation, especially as this coal power plant was already under construction and would have been highly profitable, at least at the time. Moreover, Epsilon had already gained a foothold in the conventional energy business through building up necessary structures and competencies. However, Epsilon ceased the construction and took the opportunity to enter the renewable energies business in 2009.

In 2010, Epsilon capitalized on its earlier efforts to identify market changes and developments by recognizing that the future prospects of conventional energy generation had become increasingly uncertain and scarcely predictable, whereas the development of renewable energies was highly predictable due to guaranteed feed-in remunerations. Thus, its 2010 Management Report stated that:

> *Currently, there is no sufficiently reliable information available on the future role of coal power plants in the German energy industry. In view of this still uncertain role of coal power plants for the future of German energy supply according to the German government's energy concept, Epsilon considered it expedient to put the project on hold.*

Thus, the company undertook a strategic realignment, including the divestiture of its entire conventional energy generation capacities and a focus on renewable energies. To accelerate growth in solar energy, Epsilon established a new company with a clear focus on this renewable energy segment. At the same time, Epsilon acquired several wind turbines to strengthen its footprint in the wind power business and to further the company's transformation.

Phase IV (2011–2015). In 2011, Epsilon reinforced its position in the renewable energies business again by investing in the development of energy storage solutions in order to balance fluctuating energy production from renewable sources like the sun or the wind, and by undertaking large-scale investment to accelerate the expansion of its renewable energy capacities. However, Epsilon's expansion of renewable energy capacities decelerated in 2012, particularly due to a decrease in available locations for wind turbines. Thus, to gain early access to new potential wind turbine locations and to further develop its competencies in this future-oriented business area, the company acquired a wind project developer. As one Division Head, Transmission of Epsilon explained:

> *In the field of renewable energies, we had reached growth limits, which made it increasingly difficult to further expand our renewable energy capacities. The acquisition of a wind project developer was therefore a logical next step to accelerate growth in this segment and to expand our competencies.*

In the context of this acquisition, Epsilon focused its energy generation strategy on wind power, which also led to the decision to terminate any further investments in solar energy due to perceived changes in feed-in remunerations for this form of renewable energy.

> *The business model of our renewable energies business is essentially based on the stable framework conditions of the Renewable Energy Sources Act. However, due to the further reductions in feed-in compensations for solar energy introduced by the German government, our renewable energies business will no longer realize any further solar power plants apart from those projects that have already started, so that future activities in this area will focus on the operation or leasing of existing plants.*
>
> Management Report 2012, Epsilon

In particular, the decision to terminate any future solar power investments highlighted how Epsilon did not blindly believe in formerly established scenarios for decision making, but rather had appropriate structures and mechanisms in place to perceive

changes in the economic environment and evaluate market opportunities and threats, which it could then translate into concrete actions. Epsilon also continuously reviewed its assumptions with respect to the development of conventional energy generation, and thereby came to the conclusion in 2012 that the market still did not provide sufficient incentives for further investments in this form of energy generation. Thus, the 2012 Management Report of Epsilon states that:

> *The current market environment does not yet offer sufficient economic incentives for the construction of a further gas and steam power plant for peak and medium load. Further market and political developments are being monitored. The ongoing in-depth evaluations of the economic viability of the project and financing models will be continued.*
>
> Management Report 2012, Epsilon

On the basis of Epsilon's acquisition of the wind project developer and the continuous development of its capacities and competencies in wind power, further intensifying the expansion of wind power projects to utilize its capacities and competencies in this segment would have been an advantageous path to pursue. However, having early perceived ongoing changes in the remuneration policies for wind power that would impair the future profitability of those investments, Epsilon made the decision in 2013/2014 to also preliminarily terminate any further investments in this area of renewable energy. Indeed, Epsilon's CEO argued that:

> *At that time, there were numerous indicators suggesting that we should further expand our renewable energy capacities, not only based on our previous acquisition of the wind project developer. However, we also perceived signals from politicians that there would be changes in renewable energy compensation policies in the near future.*

Again, Epsilon underwent another strategic change in focus. The company now sought to monetarize its existing investments in renewable energies while continuing to strengthen

the highly promising energy-related service business (which the company had developed over the past years), as well as pursuing new valuable business areas in order to continuously stay one step ahead of the competition.

To summarize the case of Epsilon, in the years since the market liberalization in 1999, the company frequently proved its ability to cope with market changes. Although luck played a role in the company's development, Epsilon nonetheless repeatedly demonstrated a continuous ability to act with necessary foresight, pay attention to even weak signals, and ensure that it had adequate structures and monitoring mechanisms in place to perceive those signals and take appropriate actions. Thereby, Epsilon's decisions to withdraw from conventional energy generation and later to even withdraw from renewable energy generation highlighted how the company would constantly evaluate and adjust its decision making assumptions, instead of doing what it had always done. Moreover, Epsilon at any point had a wide scope of opportunities available, because it continuously and proactively created new alternative options instead of fading out options and concentrating only on the obvious.

5.3.2. THE CASE OF ZETA

Similar to Epsilon, Zeta is a small to medium-sized regional utility company that did not possess energy generation capacities on entering the liberalized German energy market. Although Zeta also built up its own energy generation capacities, the company exclusively focused on renewable energies. Thus, in contrast to the abovementioned cases of Alpha, Beta, Gamma, Delta, and even Epsilon, Zeta never entered the field of

conventional energy generation. In retrospect, one must say that this was fortunate, the company once having concrete plans to do so.

Thus, instead of following the moves of the majority of market participants, the company stands out in the liberalized German energy market for its distinctive and foresighted strategic decisions. Figure 9 presents an overview of the key milestones in the development of Zeta.

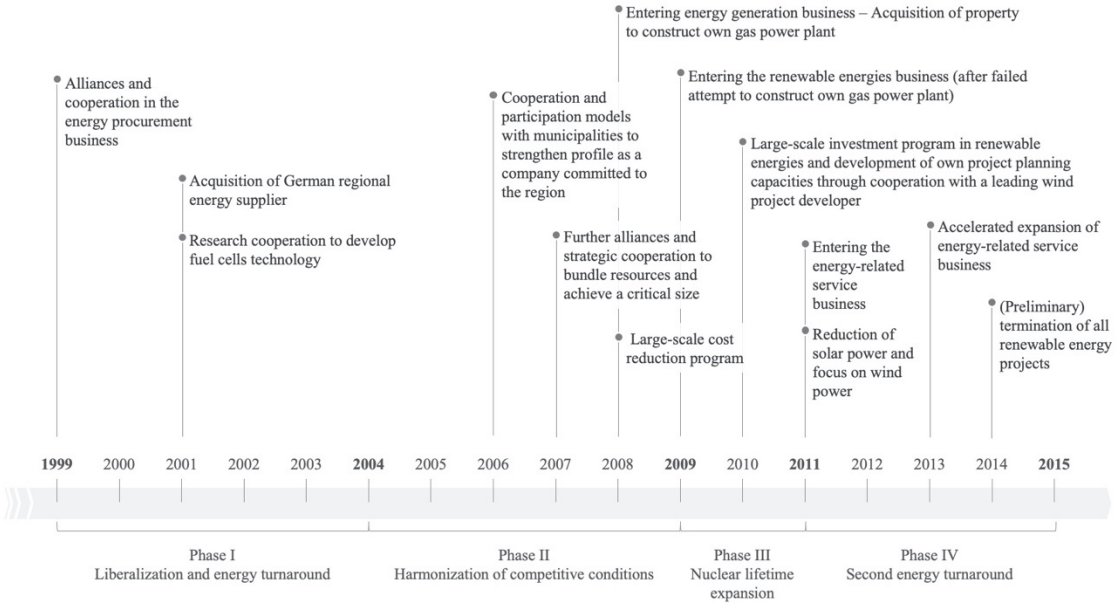

Figure 9: Key Milestones in the Development of Zeta

Phase I (1999–2004). In the early years after the market liberalization, Zeta was primarily focused on realizing synergy potentials based on size and on achieving efficiency gains. Under the given circumstances at the time and particularly with respect to significant

prices decreases, it was a reasonable step to enter into alliances and cooperation with other small to medium-sized regional utility companies. Thus, by bundling purchasing volumes, Zeta was able to counteract the decline in energy prices. While further pursuing its growth strategy, Zeta concluded the acquisition of another German regional energy supplier in 2001. Thereby, the acquisition was motivated by realizing further synergy potentials besides energy procurement, for example in the energy sales business and in administrative functions.

In the same year, Zeta took a step that for the first time exemplified its future orientation. Thus, in a situation that was characterized by market consolidation and by market participants almost exclusively concentrating on rapid growth in their existing business areas, Zeta entered into cooperation with a leading fuel cell producer to further advance its energy storage technologies.

Phase II (2004–2009). In Phase II, Zeta further intensified its growth endeavors through alliances and cooperation with other regional energy suppliers and municipal utilities, on the one hand to demonstrate its ties to the region and on the other to continue its growth and to achieve a critical size. As the company's 2007 Management Report stated:

> *In structural terms, the energy sector will be subject to massive consolidation trends in the upcoming years. Only by joining forces into larger units will local and regional utilities reach the critical mass within which economies of scale can be achieved that in turn are required to create and maintain profitability.*

Thereby, one major aim of the company at that time was to realize further synergy potentials through shared services.

> *As a concrete effect of this strategy, first cooperation possibilities were developed in the year under review with neighboring utilities with at least partial municipal ownership. The primary objective was to pool resources and thus generate synergy effects, primarily in the areas of network management and shared services.*
> Management Report 2007, Zeta

To cope with the significant energy price declines and the market pressure on energy sales, and thus to maintain its competitiveness in an increasingly dynamic energy market, Zeta undertook a large-scale cost reduction program in 2008. Indeed, its 2008 Management Report stated that:

> *The increasing market pressure on energy sales will also result in drastic company-wide cost savings. Only in this way we will succeed in sustainably ensuring the competitiveness of our business.*

Moreover, again the company strived to realize further cost reductions through intensifying its efforts to continue growth.

> *Therefore, through strategic cooperation and mergers we are striving to achieve the critical size and the associated cost degression that will secure Zeta the best possible long-term business prospects.*
> Management Report 2008, Zeta

However, at the end of 2008, Zeta's growth effort increasingly reached its natural limits, and thus it became more and more difficult to find new cooperation and especially appropriate takeover candidates. As a consequence, Zeta decisively took the next logical step by deciding to enter the energy generation business on its own. Although renewable energies had gained increasing importance at that time, driven by a further amendment to the Renewable Energy Sources Act and the introduction of CO2 certificates, which increased the production costs for conventional energy generation, Zeta originally planned to enter the conventional energy generation business. Even though the company

had already acquired corresponding properties for the construction of a gas power plant, the plans could (fortunately) not be realized, as the CEO of Zeta explained:

> *We actually planned to build a gas power plant. However, this could not be realized for other reasons. Looking back now, we are happy today, because all these power plants are not really blessed in terms of profitability. (...) I believe that this is sometimes also coupled with a certain amount of luck.*

Although fortune is one thing, what you make of it is something else. Zeta made the best of the situation. Indeed, it took the opportunity to become even more prepared for the upcoming uncertainties in the German energy market. Thus, what really drove the company's development in the following years was its willingness to accept the high level of market dynamism and uncertainty. Zeta established the appropriate structures and processes to early perceive ongoing market changes and to continuously create strategic options in order to quickly adapt to changing circumstances. This attitude had already become part of Zeta's DNA in 2008 and significantly affects the company's behavior even today. In its 2008 Management Report, the company highlighted:

> *The forecast report makes it clear that the future of the energy market is fraught with numerous unknowns. In this regard, Zeta's success will depend more than ever on responding promptly and appropriately to changes in the underlying conditions. In addition to the availability of strategic options and corresponding operational implementation plans, this requires in particular the willingness to adapt systems and processes over and over.*

This also resulted in a general orientation of the company toward accepting uncertainties and ambiguities in decision making instead of understanding old assumptions regarding future development as objective knowledge that should not be amended. Thus, according to the company's 2008 Management Report:

> *The present management report illustrates the extent to which companies in the energy market are currently facing and will continue to face significant changes in the legal and structural framework conditions that are difficult to predict. Accordingly, forecasts of business developments should be seen less as the result of objective knowledge and more as a mirror image of numerous subjective and premise-driven assumptions.*

Accordingly, Zeta continuously strived to create strategic options, especially seeking stable development options in an increasingly uncertain and unpredictable market environment.

Phase III (2009–2011). As an alternative to conventional energy generation, Zeta also advanced options for entering the renewable energies business. Thus, the company continued with its strategy to become an energy generator, but from now on focused on renewable energy sources.

> *Nevertheless, it was a conscious decision to invest in conventional power plant capacities, and that is how it turned out. As an alternative, renewable energies were repeatedly assessed and examined, and when one option was not possible, the other was implemented.*
> CEO, Zeta

However, the CEO also admitted that *"the fact that we did not possess any energy generation capacities at that point certainly influenced our decision in favor of renewable energies."* After certain initial investments in renewable energies, in particular in solar power plants, Zeta centralized its renewable energy activities within a new business unit in 2010 in order to establish a basis for accelerated future growth. Thus, Zeta's CEO emphasized that:

> *We have also combined every activity that has to do with renewable energies – today extended by storage technologies – in a new, spun-off business unit to concentrate responsibilities and provide the basis for accelerated growth.*

As in 2010, market dynamism and hence the level of uncertainty further increased, leading Zeta to revise its strategy process to strategically prioritize and address future growth potentials while putting a greater emphasis on flexibility. This later became a key success factor in this rapidly changing environment.

> *In 2010, it was actually clear that we had to manage the strategy process differently from in the years before. (...) We recognized that, on the one hand, the industry has changed and continues to change, and that this change is more than serious (...) It ultimately leads to the need to deal with priorities and to create clarity with respect to the allocation of resources, about what should we do in the future and in an intensified manner, and what we had better not do.*
>
> CEO, Zeta

As Zeta perceived an ongoing market shift from centralized energy generation by large-scale coal, gas, and nuclear power plants toward more piecemeal decentralized energy generation by renewable energy sources, the company strategically defined renewable energies as a key area for future resource allocation. This decision to focus on renewable energies and on wind power in particular was followed by a large-scale investment program to strengthen the company's position in the renewable energies business.

> *We made the decision to focus on renewable energies as early as the end of 2010 (...) and thus, long before the political decisions to undertake an energy turnaround were made. In other words, we had already recognized the signs.*
>
> CEO, Zeta

Thus, to further accelerate growth in the area of wind power, Zeta entered into cooperation with a leading wind project developer, which enabled the company to gain early access to appropriate locations for the construction of new wind turbines.

Phase IV (2011–2015). In Phase IV, after the nuclear accident in Fukushima and the German government's subsequent nuclear phase-out decision, sustainable energy

generation gained another development boost. In this context, Zeta felt confirmed in its development and continued its strategy to further accelerate the expansion of its wind power capacities.

However, even at that time, when Zeta's strategy seemed more promising than ever, the company was engaged in a constant search for valuable growth opportunities, as highlighted in its 2011 Management Report: *"At the same time and in accordance with our growth strategy, we must proactively identify and develop existing market niches as well as new, valuable business areas."* Thus, the energy-related service business was identified as having significant future growth potential, which in fact became the company's new core business just one year later. Thereby, Zeta entered the energy-related service business with a strategic and future-oriented focus, rather than this being compelled, as was the case of many of the company's counterparts, for which the service business was more or less their last resort. This strategic move brought Zeta one step ahead of the competition. In addition to the field of energy efficiency solutions, for example, *"one aspect of the future-oriented alignment of our company in 2011 was the targeted expansion of our involvement in the field of electric mobility,"* according to Zeta's 2011 Management Report.

In 2011, Zeta perceived signals that the upcoming amendment to the Renewable Energy Sources Act, which was passed by the German government in 2012, would include reductions in feed-in remunerations for solar power. As a consequence, the company questioned the profitability assumptions regarding its solar power plants that were at the planning and development stage at the time, and projected that the expected returns for these investments would not be sufficient. Thus, Zeta refused to be blinded by its previous

success and made the incisive decision to terminate several projects even before commissioning. According to the company's 2011 Management Report:

> *Although numerous valuable projects have been realized in the solar energy segment, in 2011 several projects had to be terminated before commissioning owing to insufficient expected returns due to the reductions in feed-in remunerations under the imminent amendment to the Renewable Energy Sources Act.*

Furthermore, in 2012 Zeta again reduced its investments in solar power, as stated in its 2012 Management Report, *"due to the reductions in feed-in remunerations for solar power, the respective investment budget was not fully deployed."* In these ways, it was apparent that the company did not uncritically believe in earlier established scenarios for decision making, but rather constantly questioned planning assumptions against the background of changing framework conditions.

Moreover, Zeta perceived changing circumstances in the area of wind power at an early stage and was also not afraid of decelerating its planned investments in the field of renewable energies. Indeed, this represented a remarkable step, as there were strong arguments in favor of accelerating the expansion of its wind power capacities, especially given its existing competencies in this area as a consequence of its cooperation with the wind project developer only two years before. In its 2012 Management Report, Zeta stressed that:

> *With the commissioning of our new wind farm, we will reduce the high annual investments in renewable energies. The main reason for this is the increasing uncertainty regarding the economic framework conditions set by politics, in particular with respect to the remunerations under the Renewable Energy Sources Act.*

Thus, as even the framework conditions for new investments in the field of renewable energy became increasingly uncertain and hard to predict, Zeta moved its focus from renewable energy production to the area of energy-related services.

> *The past years in the energy market have shown that statements about future developments are subject to considerable uncertainty. This is due not least to the socio-political context in which our core business areas are embedded. In addition to economic factors, it is primarily the political environment that is the decisive determinant of our corporate success. We are taking this insight as an opportunity to henceforth focus on activities that lie outside our* [former] *core business activities* [of renewable energies].
>
> Management Report 2012, Zeta

In order to further move away from the original business of energy generation toward the more future-oriented energy-related service business, Zeta sold shares in its renewable energy projects to further promote its strategic adaptation to becoming a service provider. According to Zeta's CEO:

> *We ourselves are operators of wind power and solar power plants, we are advisors in this area, and evaluate and support customers who plan to install such plants themselves.*

With the sale of the shares, Zeta was able to free up financial resources, which were immediately reinvested to strengthen its new core business. Thereby, Zeta took further initiatives to develop new profitable growth areas in the service business in order to become more independent from the constraints and the uncertain development of the energy (generation) market.

> *Today we are actually about to take the next step, to say that we have current service providers who do the operational management of one wind farm or another, and we want to include that into our company. (...) and we also want to make ourselves a bit more independent. Thus, it is the classic sense of expanding our own business area into adjacent business areas.*
>
> CEO, Zeta

As in 2014, Zeta perceived ongoing alterations in the remunerations for renewable energies that would initiate a further decrease in profitability, hence the company decided to terminate (at least preliminarily) any further investments in renewable energies.

> *In 2014, no further projects were initiated in the solar power segment due to reductions in remunerations based on the Renewable Energy Sources Act. No further projects were realized in the wind power segment either.*
> Management Report 2014, Zeta

As the CEO of Zeta explained further:

> *For all these reasons, we have decided that our investments have been completed for the time. We now view the coming years somewhat more cautiously, perhaps even more cautiously than the original valuations of those investments. At the moment, we are in an evaluation phase to say that in the next one to three years our investments will be assessed on the basis of practical tests.*

Indeed, in 2015 Zeta successfully completed another strategic adaptation: it developed from an energy sales and distribution company to a producer of renewable energies and finally to a provider of energy-related services.

> *We will continue to accelerate the topic of energy-related services and will develop additional innovative products in 2015 to support our core business and present ourselves as an energy service provider.*
> Management Report 2015, Zeta

In conclusion, Zeta's development over the years since the market liberalization exemplified how it was able to continuously undertake necessary strategic adaptations even before it was forced to do so, and thus it always stayed one step ahead of the competition. Three factors in particular drove Zeta's success in a highly dynamic and uncertain market. First, instead of uncritically following routines in terms of familiar processes and resorting to historically proven recipes for success, Zeta's decisions repeatedly highlighted a proactive questioning and adaptation of actions to changing

conditions. That is it say, it refused to do something because it had always done so or it had been successful with such actions in the past; rather, it continuously evaluated and amended its actions. Indeed, the CEO of Zeta emphasized that:

> *It's all about questioning – 'Why is this project, this measure, this activity advantageous?' – and then prioritizing and pushing those relevant projects forward; and on the other hand, it's about simply leaving things aside – 'That's what I've always wanted to do' – because one simply does many things in the usual way and perhaps doesn't even think about whether this still has any relevance in a changed market.*

Second, the basis for Zeta's capacity to perceive ongoing market changes and alterations of the framework conditions for its investment decisions were put in place in 2008 by accepting dynamism and uncertainty as continuing characteristics of the energy market since the liberalization. Zeta established appropriate and flexible structures, processes and mechanisms to recognize and act on such changing circumstances. To ensure the permeability of information, Zeta attached great importance to communication, that is, not dismissing opposing opinions as false or dubious or even suppressing counterarguments, but rather encouraging everyone within the organization to communicate his or her perceived developments and changes. Thus, Zeta's CEO stressed that *"although this hierarchical structure formally exists, because it is necessary from an organizational point of view, there is a lot more communication today."* Third, Zeta avoided following strict and binding investment criteria and guidelines, and instead continuously challenged existing investment assumptions behind the changing circumstances, so that standardized profitability thresholds did not systematically exclude strategically important investments. As the CEO of Zeta argued:

> [In retrospect, companies] *have frequently been handicapped by return expectations that were either unrealistically high or represented an obstacle for entering a certain market segment. (...) based on the understanding that an investment may only be made if a certain level of return on the investment can be achieved.*

In fact, Zeta repeatedly promoted strategic options, affording it more room for maneuver in order to act on changed circumstances and to seize new market opportunities, as for example in renewable energies and later in the energy-related service business.

6. FINDINGS

Nothing in life is to be feared, it is only to be understood.

Marie Curie

6.1. OCCURRENCE OF SELF-REINFORCING MECHANISMS

Existing literature in the field of organizational path dependence has identified five distinct self-reinforcing mechanisms that promote the development of organizational paths through stabilizing organizational processes (Schreyoegg et al. 2011; Schreyoegg and Sydow 2012), thereby reducing the range of development options available to an organization (Koch 2011, p. 338). These self-reinforcing mechanisms are scale, complementary, learning, coordination, and expectation effects (Sydow et al. 2009; Schreyoegg et al. 2011; Apajalahti and Lovio 2012; Schreyoegg and Sydow 2012). However, the case studies of Alpha, Beta, Gamma, Delta, Epsilon, and Zeta have unveiled that instead of focusing on the self-reinforcing effects themselves, it is essential to understand their underlying modes of action, as in practice, these effects appear in different dimensions and manifestations. Figure 10 provides an overview of the case study findings.

Looking deeper into the self-reinforcing mechanisms' modes of action, one can observe 21 different dimensions of self-reinforcing mechanisms, out of which seven new dimensions emerged during the analysis. Furthermore, 47 different manifestations of the

self-reinforcing mechanisms were identified that provide insights into how these stabilizing processes unfold in practice.

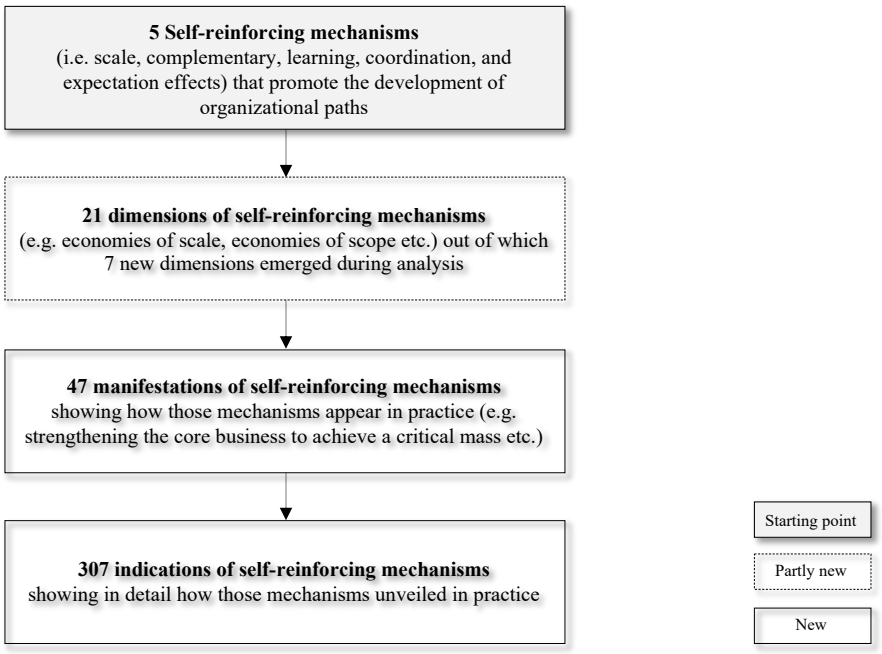

Figure 10: Overview of Findings

The dimensions and the manifestations of the self-reinforcing mechanisms that were identified and uncovered in the case studies are discussed below. Examples of each manifestation are provided in order to highlight how these stabilizing processes work in practice.

6.1.1. SCALE EFFECTS

The literature has identified two dimensions of scale effects: economies of scale and economies of scope (Panzar and Willig 1981, 1977; Rumelt 1982). Both dimensions of scale effects could be found in the development of the firms considered in this investigation, in various manifestations. Table 6 provides an overview of the dimensions and the manifestations of the scale effects that appeared in the case studies.

Dimension of Scale Effects	Manifestation	Example	Source
Economies of scale	Strengthening the core business to achieve a critical mass (in the conventional energy generation business)	*"In structural terms, the energy sector will be subject to massive consolidation trends in the upcoming years. Only by joining forces into larger units will local and regional utilities reach the critical mass within which economies of scale can be achieved that in turn are required to create and maintain profitability."*	Management Report 2007, Zeta
	Realizing synergy potentials and cost degression in the production business (energy generation)	*"(...) the use of economies of scale should systematically enhance synergies and economic potentials in the operation of conventional energy generation plants."*	Management Report 2010, Beta
	Realizing synergy potentials and cost degression in raw material procurement	*"The acquisitions will enable us to leverage additional volume effects in purchasing raw materials. Therefore, we combine procurement volumes. (...) The procurement volume of natural gas that we use both for the heating market and in electricity generation."*	Management Report 2002, Alpha
Economies of scope	Realizing synergy potentials through combination of electricity and heat generation	*"The planned construction of a new coal power plant at the existing location should also secure our district heating supply from cogeneration production in future."*	Management Report 2005, Epsilon
	Realizing synergy potentials through own raw material extraction for energy generation	*"Alpha obtains coal from its own open-cast mines. (...) 89 percent of this coal was used for energy generation in our power plants."*	Management Report 2004, Alpha

Table 6: Dimensions and Manifestations of Scale Effects

Economies of scale appeared as the focal firms strengthened their core business of conventional energy generation in order to achieve critical mass. Other manifestations of economies of scale were detected as firms strived to realize synergy potentials and cost degression in their energy generation business, through increasing their energy generation

capacities, or in the procurement or extraction of raw materials. Economies of scope could be found in two different manifestations: as firms strived to realize synergy potentials through a combination of electricity and heat generation in order to achieve a relative decrease in the cost per unit; or through establishing or expanding their own raw material extraction for subsequent energy generation, for example through expanding coal extraction capacities for later use in their coal power plants.

6.1.2. COMPLEMENTARY EFFECTS

According to the literature, complementary effects may appear in two different dimensions. While striving to realize synergies arising from the interaction of business units (Prahalad and Hamel 1990), firms take growth opportunities in adjacent (and interrelated) areas (Pierson 2000; Sydow et al. 2009) or share resources in terms of skills, competencies, or customers (Pehrsson 2006). In the cases presented above, both dimensions of complementary effects could be observed. Thereby, complementary effects occur in different manifestations. In Table 7, an overview of the dimensions and the manifestations of the complementary effects that appeared in the case studies is provided.

With respect to the first dimension of complementary effects, i.e., growth opportunities in adjacent areas, one could observe the focal firms expanding their businesses into adjacent business areas, for instance: offering energy-related services or energy efficiency solutions, or becoming e-mobility providers; expanding their value-added depth in the renewable energies business, particularly through the acquisitions of wind project

developers; expanding their value-added depth toward the exploration of raw materials; or expanding their value-added breadth through accessing complementary forms of energy generation, like the renewable energies business.

Dimension of Complementary Effects	Manifestation	Example	Source
Growth opportunities in adjacent areas	Expanding the business into adjacent business areas (e.g. energy-related services, energy efficiency solutions, e-mobility)	*"Today we are actually about to take the next step, to say that we have current service providers who do the operational management of one wind farm or another, and we want to include that into our company. (...) and we also want to make ourselves a bit more independent. Thus, it is the classic sense of expanding our own business area into adjacent business areas."*	CEO, Zeta
	Expanding the value-added depth in the renewable energies business (through the acquisition of a wind project developer)	*"In the field of renewable energies we had reached growth limits, which made it increasingly difficult to further expand our renewable energy capacities. The acquisition of a wind project developer was therefore a logical next step to accelerate growth in this segment."*	Division Head, Transmission, Epsilon
	Expanding the value-added depth through exploration of raw materials	*"The business involving the liquefaction, shipping and regasification of natural gas will become increasingly important for gas supply in Europe in the future. We are therefore working on entering this market."*	Management Report 2006, Alpha
	Expanding the value-added breadth through complementary forms of energy generation	*"It has been said that we are counting on the energy turnaround and that these gas power plants are now being used as a complementary energy generation technology to the volatile energy generation from renewable energies."*	Senior Manager, Business Development, Gamma
Shared resources	Realizing synergy and growth potentials in sales through joint customer groups	*"We achieve further synergies through horizontal integration, that is, by selling electricity and gas through one and the same group company."*	Management Report 2005, Alpha
	Realizing synergy and growth potentials through the joint use of services (i.e., shared services)	*"As a concrete effect of this strategy, first cooperation possibilities were developed in the year under review with neighboring utilities with at least partial municipal ownership. The primary objective was to pool resources and thus generate synergy effects, primarily in the areas of network management and shared services."*	Management Report 2007, Zeta
	Realizing synergy and growth potentials through a shared knowledge base	*"The bundling of our R&D measures enables us to make more effective use of know-how and resources. Additional synergies can be leveraged by more closely interlocking projects in which several divisions are involved."*	Management Report 2003, Alpha

Table 7: Dimensions and Manifestations of Complementary Effects

The second dimension of complementary effects, i.e., shared resources between two or more business units, could be found by the focal firms striving to realize synergy and growth potentials in sales through joint customer groups, for instance: selling electricity

and heat products; through the joint use of services, such as in terms of shared billing systems; or finally, through a shared knowledge base.

6.1.3. LEARNING EFFECTS

According to the literature, there are two dimensions of learning effects that stimulate companies to pursue a once entered path of development. Given their natural proclivity toward exploitative learning, firms typically focus on achieving efficiency improvements and on exploiting existing business areas, as the returns gained from preexisting activities are more certain and closer in time (March 1991; Levinthal and March 1993). Besides the two dimensions of learning effects mentioned in previous literature, two further dimensions emerged during the analysis: the continuous improvement of existing competencies, and the routinization of activities. In the case studies presented above, these dimensions of learning effects occurred in multiple manifestations while influencing the development paths of the focal firms. Table 8 provides an overview of the four dimensions of the learning effects that emerged, alongside examples of how they occurred in practice.

Efficiency improvements occurred as firms strived to realize cost reduction potentials, improved the efficiency levels of conventional power plants by reducing the inputs of raw materials required for energy generation (i.e., coal or gas consumption), or optimized existing activities and processes in order to become more efficient. While attempting to exploit existing business areas, the focal firms were found to focus on proven technologies of conventional energy generation by expanding their coal, gas, or nuclear

energy generation capacities, modernizing existing conventional power plants in order to reduce CO2 emissions and thus comply with climate protection requirements, or maintaining existing conventional power plants in order to extend their lifetime.

Dimension of Learning Effects	Manifestation	Example	Source
Efficiency improvements	Realizing cost reduction potentials	*"Due to the further liberalization of the energy markets, the market environment will continue to be characterized by price and sales risks. These market risks are countered by consistent cost management."*	Management Report 2001, Delta
	Improving efficiency levels of conventional power plants	*"With respect to the high share of coal-fired power plants in our electricity generation portfolio, the introduction of an emissions tax is another major environmental risk. We are countering this risk with efficiency-enhancing measures, including the modernization of our power plant portfolio."*	Management Report 2000-2001, Alpha
	Optimizing existing activities and processes	*"Accordingly, our strategic focus is on the radical restructuring of the conventional generation business. This includes the cost-optimal alignment of all activities."*	Management Report 2013, Beta
Exploiting existing business areas	Exploiting existing competencies by focusing on proven technologies of conventional energy generation	*"We thought, 'OK, that's us. Nobody can plan, build, operate and maintain power plants as well as we do, so we go in there and become the number one base load provider for Germany, while the others, they can all just look at our tail lights.'"*	Former Manager, Internal Consulting, Beta
	Modernizing existing conventional power plants to reduce CO2 emissions	*"We are also making a contribution to climate protection by building highly efficient coal and gas power plants to replace high-emission old plants."*	Management Report 2011, Alpha
	Maintaining existing conventional power plants to extend their lifetime	*"We are making significant investments in maintaining and expanding our conventional energy generation and gas infrastructure. In the coming year, we will invest in the expansion, replacement, and maintenance of power generation from coal, gas, and nuclear power. This includes, among other things, new fossil fuel power plant construction projects."*	Management Report 2012, Beta
NEW: Improvement of existing competencies	Strengthening existing competencies	*"Through its focused positioning and consistent alignment, Beta can retain and further develop its key existing strengths and advantages."*	Management Report 2014, Beta
	Further developing existing competencies and technologies	*"In the long-run, we can only remain competitive if we continuously develop existing technologies."*	Management Report 2008, Alpha
NEW: Routinization of activities	Adhering to familiar and proven processes	*"I think that openness to change would have been crucial: how quickly am I able to adapt to change, and accordingly to react* [to changed circumstances]*."*	Senior Manager, Group Controlling & M&A Valuation, Alpha

Table 8: Dimensions and Manifestations of Learning Effects

Similarly, the new dimensions of learning effects occurred in various manifestations. The case studies revealed the focal firms focusing on continuously strengthening their existing competencies and further developing existing technologies instead of learning new

competencies or switching to new technologies. Moreover, with respect to the routinization of activities, the case studies unveiled the firms' adherence to familiar as well as historically proven activities and processes.

6.1.4. COORDINATION EFFECTS

Coordination effects lie at the heart of organizational functioning (Sydow et al. 2009). Thus, these effects are built on efficient and foreseeable interactions among actors as they follow organizational rules and guidelines (Sydow et al. 2009). According to Martinez and Jarillo (1989), coordination consists of three dimensions: centralization; formalization and standardization; and planning, budgeting, and goal setting. However, the case studies unveiled formal authority as an additional dimension. Thereby, those four dimensions of coordination effects occurred in different manifestations. Table 9 outlines the dimensions and the manifestations of coordination effects and illustrates how they appeared in the case studies.

With respect to centralization, that is, the first dimension of coordination effects, the focal firms were seen to centralize their activities in order to improve their level of control or to realize synergy potentials arising from the combination of formerly small businesses to large-scale business units. Also observable were the centralization endeavors of the focal firms, being motivated to increase internal perceptions of company divisions and technologies that did not receive the necessary attention within their decentralized structures, such as through bundling all renewable energy activities.

Dimension of Coordination Effects	Manifestation	Example	Source
Centralization	Improving control through centralizing activities	*"There was a new constellation with larger core businesses. At the same time, of course, there was also a certain degree of centralization in the organization in order to increase the manageability of the whole thing."*	Former CEO, Alpha
	Realizing synergy potentials through centralizing activities	*"For example, the program aims to bundle activities with high standardization potential in separate units in order to benefit from synergy and bundling effects."*	Management Report 2011, Beta
	Increasing the internal perception of company divisions and technologies	*"Renewable energies have had a rather subordinate role in the individual company divisions, because they were rather small and we have seen at this point that we have to place renewable energies more prominently, we have to pay more attention to them, because in the conventional business area we also had a whole series of hydroelectric power plants and the first wind power plants, but these of course lagged far behind conventional generation in terms of importance. And of course we have seen quite clearly that we have to do something about this, we have to centralize them, because otherwise the delicate little plant of renewable energies will always be in the shade of a big tree that takes the sun from it, to put it metaphorically."*	Senior Manager, Group Controlling & M&A Valuation, Alpha
Formalization and standardization	Strictly following rules and standardized processes and procedures	*"That would actually have been the point where someone should have said, we're doing something stupid, everybody holds your horse. (…) But instead, our M&A division had their own guidelines, they said, we are in charge of selling that business unit and obtaining the highest price possible and that's already enough work to do – we can't deal with whether or not this is the right strategic decision."*	Former Manager, Internal Consulting, Beta
	Following strict and binding investment criteria and guidelines	*"We will only consider acquisitions if our financial criteria are met. Thereby, the most important threshold is the internal rate of return, which must at least equal the cost of capital plus a premium."*	Management Report 2008, Alpha
Planning, budgeting, and goal setting	Believing in once established scenarios for decision-making	*"The parameters may not have been so prominent that one could have made scenarios and said, 'OK, if in the next five to ten years the share of renewable energies grows to that size, then that means the following for our conventional energy production possibilities.'"*	Former CEO, Alpha
	Understanding assumptions as objective knowledge	*"You can't simply say, 'all or nothing,' but you have to make certain assumptions and it is clear that some of those assumptions were certainly too optimistic."*	Senior Manager, Business Development, Delta
NEW: Formal authority	Establishing hierarchical structures and clear roles and responsibilities	*"The structure of Beta is characterized by a clear allocation of roles and responsibilities within the association of all group companies and divisions."*	Management Report 2011, Beta
	Assigning clear decision-making authority at the top level	*"And then the CEO can decide, because it mustn't be an automatism, whether he or she gives more weight to certain things or whether he or she says that we don't believe in the scenario, so we leave that out."*	Division Head, Corporate M&A, Beta

Table 9: Dimensions and Manifestations of Coordination Effects

Formalization and standardization could be observed in terms of corporate actors strictly following rules and standardized processes and procedures, and in particular, following strict and binding investment criteria and guidelines. Planning, budgeting, and goal setting as a third dimension of coordination effects could be observed in the following

two manifestations. On the one hand, the focal firms seemed to believe in formerly established scenarios as the basis for their decision making, regardless of any changes to the framework conditions. On the other hand, it was repeatedly observed that the firms understood assumptions as objective knowledge instead of perceiving them as subjective and premise-driven assumptions. Finally, the new dimension of coordination effects, i.e., formal authority, appeared in practice as focal firms established strictly hierarchical structures while allocating clearly distinguishable roles and responsibilities, and assigned clear decision-making authorities at the top level.

6.1.5. EXPECTATION EFFECTS

Existing literature on path dependence, and in particular on self-reinforcing mechanisms, discusses five dimensions of expectation effects that result in increasingly stabilized activity patterns that are difficult to change (Leibenstein 1950; O'Reilly 1989; Haller and Norpoth 1994; O'Reilly and Chatman 1996; Pierson 2000; Luhmann 2012). The dimensions of expectation effects that influence firms' actions are social expectations, aspirations for social belonging, the pursuit to end up on the winning side, informal and unwritten norms, and seeking to legitimize decisions. In the case studies, these five dimensions of expectation effects could be found in different manifestations.

In addition to these dimensions of expectation effects, already identified in existing literature in the field of path dependence research, the case studies unveiled further dimensions of expectation effects that are grounded in the phenomenon of groupthink (Janis 1971, 1972). In the abovementioned case studies, four symptoms of groupthink

(Janis 1971, pp. 85–88; Montanari and Moorhead 1989, pp. 210–211) could be identified, which in turn promoted observable defects in the focal firms' decision-making processes and consequently resulted in poor-quality decisions.

First, one could observe focal firms being blinded by an illusion of invulnerability that created excessive optimism and encouraged them to take extreme risks. Second, one could observe collective efforts to rationalize in order to discount warnings, which might have otherwise led the focal firms to reconsider their assumptions before recommitting to past policy decisions. Third, the case studies revealed direct pressure on corporate actors who express strong arguments against any of the group's stereotypes, illusions, or commitments, making clear that such dissent is contrary to what is expected of loyal group members. Fourth, one could observe corporate actors' self-censorship of deviations from the group consensus, reflected in these actors' inclination to minimize the importance of her or his doubts and counterarguments. Table 10 provides an overview of the dimensions of expectation effects and illustrates how different manifestations appeared in practice.

With respect to social expectations, one could observe the focal firms arguing to fulfill a social mission or duty, that is, to secure their energy supply. Similarly, the focal firms strived to fulfill their stakeholders' and public expectations. The second dimension of expectation effects, i.e., the aspiration for social belonging, was particularly reflected in corporate actors' commitment to their firms' historically grown core business of conventional energy generation. Another dimension of this form of expectation effects was the firms' pursuit to be on the winning side, which manifested itself in the focal firms following the moves of other market participants, or even the predominant opinion of the

energy industry, which could be seen for example in the utility companies' *gold rush* in the conventional power generation business.

Dimension of Expectation Effects	Manifestation	Example	Source
Social expectations	Fulfilling a social mission or duty to secure energy supply	*"As one of the world's leading energy companies, it is our social duty to act as a role model in this important field* [of sustainability] *as well. That is why we have committed ourselves to reducing our specific CO2 emissions by 50 per cent between 1990 and 2030. To achieve this, we are investing billions in highly efficient, more climate-friendly power plants."*	Management Report 2008, Alpha
	Fulfilling stakeholders' expectations (e.g. population, shareholder)	*"Our environment is determined by the expectation of customers that their energy supply is secure and that utility companies can control the effects of strongly fluctuating energy prices."*	Management Report 2009, Alpha
Aspiration for social belonging	Aspiring for social belonging to historically grown core business of conventional energy generation	*"The conventional generation unit is in fact a very special kind of people. The conventional generation unit is just really original German, they sit in their own building and have operated conventional generation there, everyone spoke German, all men, and have been doing so for 30 years."*	Former Manager, Internal Consulting, Beta
Being on the winning side	Following other market participants' moves	*"The motivation of the colleagues who decided [to invest into conventional energy generation] at that time was mainly driven by the fact that they wanted to get a slice of the cake themselves."*	Senior Manager, Business Development, Delta
	Following the industry's opinion	*"Utility companies are well-advised to invest in the energy generation business in addition to energy grid operations. Our planned coal power plant is therefore much more than just a reasonable option. For strategic reasons, it is essential to pay the greatest attention to our own energy generation."*	Management Report 2005, Epsilon
Informal and unwritten norms	Believing in historically proven ‚recipes for success' (e.g. conventional energy generation, economies of scale, efficiency improvements)	*"A nationwide electricity supply based on existing renewable energy plants alone cannot be guaranteed at present. Conventional power plants are extremely important for the security of energy supply, especially in times of bottlenecks or when renewable energy plants fail to generate electricity."*	Management Report 2012, Delta
	Assuming responsibility for the economy, climate and environment and for customers	*"Access to generation capacities will increasingly become a key issue for the future of the energy supply industry, especially against the background of the gradual phase-out of nuclear energy and the need to renew conventional power plants. In this context, Gamma will place its strategic focus on modern power plant technology in view of its corporate responsibility for the climate and the environment."*	Management Report 2007, Gamma
	Completing activities that have once begun (i.e., construction of power plants)	*"At the time when the construction of the power plant was nearly completed, it had already become apparent that the power plant would not be profitable, but it was somehow pulled through anyway."*	Former Manager, Internal Consulting, Beta
Legitimacy seeking	Actively influencing the political debate on conventional energy generation	*"The political discourse with respect to the decisive issues of the energy industry is set at both the European and the national level. This is why we have organized ourselves jointly in a cooperation of the leading municipal utilities. Together we represent about ten per cent of the German energy market and we make our voice heard at the federal level on important energy policy issues."*	Management Report 2008, Gamma
	Seeking for internal acceptance regarding investment decisions	*"At the end of the day, you have to assert yourself with your investments, so you have to be able to convince other people as well, because it doesn't help if I alone am of the opinion that this is a good investment; you have to be able to convince others."*	Senior Manager, Group Controlling & M&A Valuation, Alpha
	Seeking for stakeholders' acceptance	*"As part of the planned construction of new power plants, we offered our municipal customers the opportunity to participate in the construction of one of the new coal power plants."*	Management Report 2006, Alpha

Table 10: Dimensions and Manifestations of Expectation Effects

Dimension of Expectation Effects	Manifestation	Example	Source
NEW: Illusion of invulnerability	Being excessively optimistic (regarding the own situation)	*"This puts us in an excellent position to meet the new challenges of a changing European market environment. We are well on the way to realizing our vision of becoming the world's leading power and gas company."*	Management Report 2007, Beta
	Feeling like being the competence leader and part of an elite	*"The European energy market continues to grow together. This is creating a top league of European utility companies to which Alpha belongs."*	Management Report 2008, Alpha
NEW: Collective rationalization	Discounting warnings and weak signals as being not relevant	*"The debate had actually been going on for some time. In any case, the energy industry developed more and more toward decentralized energy generation, but we and the other large utility companies failed to draw the appropriate conclusions out of these developments or undertake an actual turnaround."*	Former CEO, Alpha
NEW: Pressure on deviations from group consensus	Dismissing opposing opinions as being false or denouncing them as being dubious	*"The problem is that these analyses and scenarios are so complicated, even the calculation models alone, they include all the power plants in Europe and energy grids and so on and they include merit orders and so on and then they calculate stochastic failures of power plants with respect to sun and wind hours and increases in installed sun and wind power and the development of energy demand and so on and so forth. Those are all assumptions on which the scenarios are based, and so every single point is vulnerable, and good news that you tell them is something that everyone wants to hear, but no one wants to hear bad news. As a consequence, they say, 'But this assumption is not true and what about that and so on.'"*	Division Head, Corporate M&A, Beta
	Downgrading dissents	*"The majority shareholder wanted to increase its influence in the company's development and in this context, forced a repurchase of shares. Although there was resistance from the management, but finally, this repurchase of shares took place. (...) So there was a board of directors who was somewhat averse to repurchasing shares and he were replaced."*	Senior Manager, Business Development, Gamma
NEW: Self-censorship of deviations from group consensus	Suppressing counterarguments	*"Nobody dared to say that renewable energies would at some point push so massively into the market that they would completely destroy the wholesale prices for electricity."*	Senior Manager, Business Development, Delta

Table 10: Dimensions and Manifestations of Expectation Effects *(continued)*

Informal and unwritten norms could be observed in the case studies through firms repeatedly believing in and resorting to their historically proven recipes for success when confronted with change, such as conventional energy generation despite the growing importance of renewable energies, economies of scale despite the growing importance of decentralized energy generation, or efficiency improvements in certain businesses despite them no longer being very profitable. Other manifestations of informal and unwritten norms appeared as the focal firms argued to assume responsibility for the economy, for the climate, for the environment and for their customers, as well as in their continuation

of once started processes, regardless of their future viability. Thus, one could observe firms completing previously started activities, for example the construction of power plants despite recognizing that they will never be profitable due to changes to key assumptions.

Legitimacy seeking represents the fifth dimension of expectation effects. In practice, legitimacy seeking took place through focal firms actively influencing the political debate on conventional energy generation in order to improve the framework conditions for their power plants, established by political decisions. Moreover, one could observe top-level managers seeking internal acceptance with respect to their investment decisions. Finally, one could see the focal firms seeking stakeholders' acceptance by involving them in their investments. For example, municipalities were involved in the construction of wind turbines, thereby gaining the opportunity to participate in profits in order to agree on their construction.

The new dimensions of expectation effects could also be found in various manifestations. For instance, the focal firms' illusion of invulnerability manifested itself as firms being excessively optimistic with respect to their current situation, even within radically changing and uncertain market conditions. Moreover, this illusion of invulnerability came to light as firms held a self-conception of being systematically relevant while arguing that energy supply would be impossible without them. It could also be seen in terms of firms holding the impression that they were the competence leaders and formed part of an elite, encouraging them to continue their once entered path of development. Collective efforts to rationalize appeared in cases of focal firms repeatedly overlooking warnings and weak signals, regarding them as irrelevant. Another aspect of groupthink and thus an additional

new dimension of expectation effects was the pressure applied to deviations from group consensus. In practice, this dimension could be found in focal firms dismissing opposing opinions as false or denouncing them as dubious, or even downgrading dissents. Finally, corporate actors' self-censorship of deviations from the group consensus could be seen in terms of employees suppressing their counterarguments in order to avoid attracting attention, for example.

6.2. REINFORCING DEVELOPMENT PATHS: NOT NECESSARILY

In total, the six case studies unveiled more than 300 incidents of self-reinforcing effects that occurred in the various dimensions and manifestations outlined above. Table 11 provides an overview of the self-reinforcing effects in their diverse dimensions and manifestations among the focal firms, and highlights their influence on the firms' development paths.

In each of the case studies presented, self-reinforcing effects could be observed that drove the focal firms to continue pursuing their once entered path of development, whether in the conventional energy business (266 incidents) or in the non-conventional energy business (40 incidents), i.e., the renewable energies or energy-related service business. In these ways, self-reinforcing effects impelled the firms to adhere to their development paths while narrowing the scope of appropriate alternatives available. This was particularly true for scale and coordination effects in all of their dimensions and manifestations. As a consequence, the potential for organizational adaptation was considerably diminished.

Table 11: Influence of Self-Reinforcing Effects on Development Paths

Self-reinforcing Mechanism	Dimension	Manifestation	Alpha	Beta	Gamma	Delta	Epsilon	Zeta
Scale effects	Economies of scale	Strengthening the core business to achieve a critical mass	Conv. (4)	Conv. (8)	Conv. (5)	–	–	Conv. (2)
		Realizing synergy potentials and cost degression in the production business (energy generation)	Conv. (4)	Conv. (3) & non-conv. (3)	Conv. (1)	Conv. (3)	Conv. (1)	–
		Realizing synergy potentials and cost degression in raw material procurement	Conv. (1)	Conv. (1)	–	–	–	–
	Economies of scope	Realizing synergy potentials through combination of electricity and heat generation	–	–	–	–	Conv. (3)	–
		Realizing synergy potentials through own raw material extraction for energy generation	Conv. (4) & non-conv. (1)	Conv. (6)	–	–	–	–
Complementary effects	Growth opportunities in adjacent areas	Expanding the business into adjacent business areas	–	*New path (3)*	*New path (2)*	*New path (1)*	*New path (2)*	*New path (6)*
		Expanding the value-added depth in the renewable energies business	–	–	Non-conv. (2)	–	Non-conv. (1)	Non-conv. (1)
		Expanding the value-added depth through exploration of raw materials	Conv. (2)	–	–	–	–	–
		Expanding the value-added breadth through complementary forms of energy generation	–	–	Conv. (4)	–	–	–
	Shared resources	Realizing synergy and growth potentials in sales through joint customer groups	Conv. (3)	Conv. (2)	–	–	–	Conv. (1) & non-conv. (1)
		Realizing synergy and growth potentials through the joint use of services	Conv. (1)	Conv. (1)	–	Conv. (1)	Conv. (3)	Conv. (1)
		Realizing synergy and growth potentials through a shared knowledge base	Conv. (3)	–	–	–	–	–
Learning effects	Efficiency improvements	Realizing cost reduction potentials	Conv. (3)	Conv. (2)	Conv. (4)	Conv. (4)	–	–
		Improving efficiency levels of conventional power plants	Conv. (9)	Conv. (2)	–	–	–	–
		Optimizing existing activities and processes	Conv. (2)	Conv. (3)	Conv. (1)	–	–	–
	Exploiting existing business areas	Exploiting existing competencies by focusing on proven technologies of conventional energy generation	Conv. (1)	Conv. (6)	Conv. (4) & *New path (1)*	Conv. (1)	–	–
		Modernizing existing conventional power plants to reduce CO2 emissions	Conv. (9)	Conv. (7)	Conv. (1)	Conv. (2)	Conv. (1)	–
		Maintaining existing conventional power plants to extend their lifetime	Conv. (1)	–	–	–	Conv. (1)	–
	NEW: Improvement of existing competencies	Strengthening existing competencies	Conv. (1)	Conv. (3)	Conv. (1) & non-conv. (1)	–	–	–
		Further developing of existing competencies and technologies	Conv. (1)	Conv. (3)	Non-conv. (1)	–	Non-conv. (1)	–
	NEW: Routinization of activities	Adhering to familiar and proven processes	Conv. (1)	–	–	–	–	–
Coordination effects	Centralization	Improving control through centralizing activities	Conv. (1)	Conv. (1)	–	–	–	Non-conv. (1)
		Realizing synergy potentials through centralizing activities	Conv. (3) & Non-conv. (1)	Conv. (1)	Conv. (2)	–	–	–
		Increasing the internal perception of company divisions and technologies	Non-conv. (2)	Non-conv. (2)	Non-conv. (1)	–	–	Non-conv. (1)

Conv. = Reinforcing the conventional path; Non-conv. = Reinforcing the non-conventional path (e.g. renewable energies, services); *New path* = Initiating a new path; (xx) Number of incidents

Table 11: Influence of Self-Reinforcing Effects on Development Paths *(continued)*

Self-reinforcing Mechanism	Dimension	Manifestation	Alpha	Beta	Gamma	Delta	Epsilon	Zeta
Coordination effects *(continued)*	Formalization and standardization	Strictly following rules and standardized processes and procedures	Conv. (2)	Conv. (3)	–	Conv. (4)	–	–
		Following strict and binding investment criteria and guidelines	Conv. (6)	Conv. (3)	Conv. (3)	Conv. (3)	–	–
	Planning, budgeting, and goal setting	Believing in once established scenarios for decision-making	Conv. (1)	–	Conv. (1)	–	–	–
		Understanding assumptions as objective knowledge	–	Conv. (1)	–	Conv. (1)	–	–
	NEW: Formal authority	Establishing hierarchical structures and clear roles and responsibilities	–	Conv. (2)	–	–	–	–
		Assigning clear decision-making authority at the top level	Conv. (1)	Conv. (5)	Conv. (1)	Conv. (1)	–	–
Expectation effects	Social expectations	Fulfilling a social mission or duty to secure energy supply	–	Conv. (3)	–	–	–	–
		Fulfilling stakeholders‘ expectations (e.g. population, shareholder)	Conv. (1) & *new path (1)*	–	–	–	–	Non-conv. (1)
	Aspiration for social belonging	Aspiring for social belonging to historically grown core business of conventional energy generation	–	Conv. (2)	–	–	–	–
	Being on the winning side	Following other market participants’ moves	–	Conv. (1)	–	Conv. (2)	Conv. (1)	–
		Following the industry’s opinion	Conv. (1)	–	–	–	Conv. (1)	–
	Informal and unwritten norms	Believing in historically proven ‚recipes for success’ (e.g. conventional energy generation, economies of scale, efficiency improvements)	Conv. (1)	Conv. (4)	Conv. (3)	Conv. (1)	–	Conv. (1)
		Assuming responsibility for the economy, climate and environment and for customers	Conv. (3)	Conv. (2)	Conv. (1)	Conv. (1)	–	–
		Completing activities that have once begun (i.e., construction of power plants)	Conv. (1)	Conv. (3)	–	–	–	–
	Legitimacy seeking	Actively influencing the political debate with on conventional energy generation	–	Conv. (1)	Conv. (1)	–	–	–
		Seeking for internal acceptance regarding investment decisions	Conv. (1)	–	–	–	–	–
		Seeking for stakeholders' acceptance	Conv. (1)	Conv. (2)	Conv. (1) & non-conv. (1)	Conv. (2)	–	Non-conv. (2)
	NEW: Illusion of invulnerability	Being excessively optimistic (regarding the own situation)	Conv. (1)	Conv. (4)	–	–	–	–
		Feeling like being the competence leader and part of an elite	Conv. (2)	Conv. (1)	–	–	–	–
	NEW: Collective rationalization	Discounting warnings and weak signals as being not relevant	Conv. (3)	Conv. (5)	Conv. (2)	Conv. (7)	–	–
	NEW: Pressure on deviations from group consensus	Dismissing opposing opinions as being false or denouncing them as being dubious	–	Conv. (3)	–	–	–	–
		Downgrading dissents	–	–	Conv. (2)	–	–	–
	NEW: Self-censorship of deviations from group consensus	Suppressing counterarguments	Conv. (1)	Conv. (2)	Conv. (1)	Conv. (1)	–	–

Conv. = Reinforcing the conventional path; Non-conv. = Reinforcing the non-conventional path (e.g. renewable energies, services); *New path* = Initiating a new path; (xx) Number of incidents

However, the cases also unveiled three exceptions to this limiting influence of self-reinforcing effects on the firms' potential for organizational adaptation. Indeed, one could observe certain effects that actually widened the scope of beneficial alternatives available to the firms, enabling them to enter new development paths as a result. Concretely, such widening effects were found in certain dimensions and manifestations of complementary, learning, and expectation effects.

The firms' search for growth opportunities in adjacent business areas (the first dimension of complementary effects) was found to have a widening effect on the scope of alternatives at Beta, Gamma, Delta, Epsilon, and Zeta. As a consequence, it stimulated all of the abovementioned focal firms – whether through force or through a chosen strategy – to enter the energy-related service business, in addition to their existing development paths.

Whereas learning effects in all dimensions and manifestations were observed to narrow the scope of alternatives available to the focal firms, reinforcing their adherence to either conventional or non-conventional paths, at Gamma the exploitation of existing competencies was found to rather widen the scope of alternatives. Thus, the company applied the competencies it had built up in the conventional energy business to renewable energies, motivating it to establish an additional development path parallel to that which already existed.

Similarly, expectation effects exclusively appeared to have limiting effects on the firms' abilities to undertake organizational adaptation. Thus, in both their various existing and new dimensions (i.e., the symptoms of groupthink), such effects had a stabilizing effect

on the firms' activity patterns, thereby reinforcing their adherence to existing development paths. However, at Alpha one could also observe a widening influence of social expectations (the first dimension of expectation effects) on the scope of alternatives available to the company, even in a state of path dependence. In particular, the presence of social expectations drove the company to undertake its initial investments in renewable energy generation, which would probably not have happened at this point in time without public pressure. Hence, social expectations motivated Alpha to establish another development path besides its already existing conventional path.

Accordingly, even though self-reinforcing effects predominantly induced the focal firms to adhere to their once entered path and thereby continuously reduced the scope of alternative options, the abovementioned exceptions emphasized that this was not necessarily the case. Rather these exceptions indicated that the self-reinforcing mechanisms' influence on the firms' development paths might have also depended on the context in which the decisions were made.

6.3. COMPANY DIFFERENCES

This analysis of the focal firms' development under the influence of self-reinforcing mechanisms has brought to light significant differences among the groups of companies and the companies themselves with respect to both the frequency and the intensity with which those stabilizing mechanisms occurred. Thus, differences in the appearance of self-reinforcing effects led to variations in the firms' adherence to their development paths, in particular with respect to the field of energy generation.

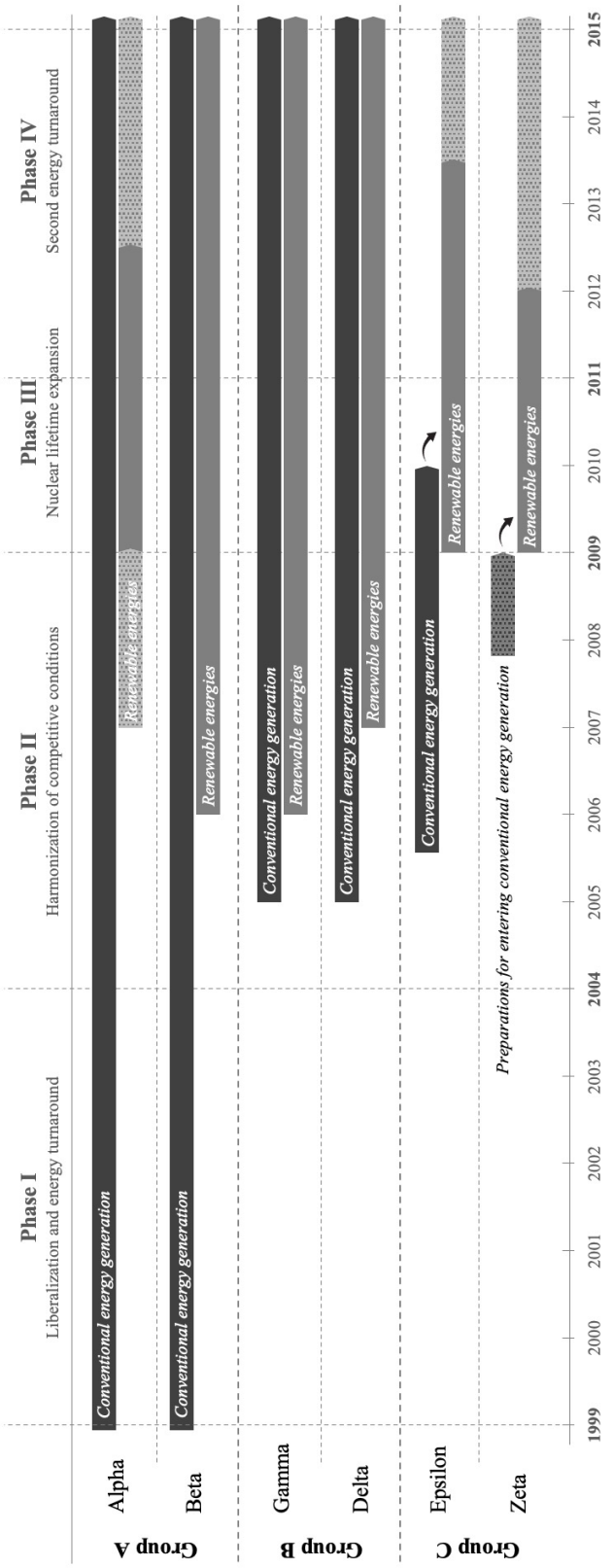

Figure 11: Comparison of Energy Generation Paths

Accordingly, Figure 11 highlights the focal firms' development paths within the energy generation business.

Group A. By far the largest number of self-reinforcing mechanisms that reinforced the conventional energy paths of companies could be found among the group A firms. As both firms in group A are multinational listed utilities with more comprehensive annual reports than their group B and C counterparts, this finding had been expected. However, the development of Alpha and Beta highlighted a significant influence of self-reinforcing mechanisms, particularly of scale, learning, coordination, and expectation effects. Especially in Phases I and II, one could observe economies of scale and scope and learning effects in terms of efficiency improvements in the firms' conventional power plants as key drivers of their path-dependent development. In the later stages of development, coordination and expectation effects increasingly came into play, driving these firms' development.

Although both companies established a second path while investing in renewable energies from 2006 (Phase II), self-reinforcing mechanisms repeatedly initiated them to focus more on conventional energy as their major development path. Thus, they apparently continued pursuing their once entered path of conventional energy generation, even as more favorable alternatives (i.e., renewable energies) became available that would have provided stable income streams due to guaranteed feed-in remunerations. What is particularly interesting here is that scale effects in the dimensions of economies of scale and economies of scope also drove Alpha's and Beta's paths in the renewable energies business, even though as business experts often stressed that the potential for achieving economic synergies in this industry is very limited. Accordingly, these companies'

tendencies to repeatedly replicate prior (successful) patterns of resource allocation became particularly obvious.

Already at the end of Phase III but even more obviously at the end of the observation period, both focal firms Alpha and Beta faced significant profitability decreases with their prior investments in conventional energy generation while lacking the financial resources required to undertake the necessary strategic changes and correct prior failures. Although Alpha and Beta (as well as Gamma and Delta) entered the renewable energy path earlier than the group C firms Epsilon and Zeta, their renewable energy capacities were insufficient to compensate for the losses from their conventional power plants. Even worse, the respective focal firms were tied to their loss-making assets, as the German Federal Network Agency did not permit the shutdown of their coal and gas power plants, because they provide a systematically relevant back-up solution for the volatile production of renewable energies. Alpha and Beta were thus in a situation of strategic lock-in.

Group B. Like Alpha and Beta, Gamma and Delta ended up in a situation of strategic lock-in. In the years following the market liberalization, both focal firms heavily invested in building up large-scale conventional energy generation capacities, to which they became tied when the market drastically changed. This was especially pertinent considering their major renewable energy investments – the construction of an offshore wind farm – which should have accounted for a large proportion of their renewable energies capacity, could not be completed even until the end of the observation period or was even stopped early.

In both cases, scale and learning effects drove the companies' development, especially in the early phases, and hence shaped a path that both companies were unable to abandon. Indeed, Gamma and Delta repeatedly resorted to their historically proven recipes for success whenever they were confronted with change. As the German energy market became increasingly dynamic and uncertain, coordination and expectation effects became more and more apparent and further solidified these companies' paths. Gamma and Delta either did not perceive the ongoing changes in the framework conditions for their conventional energy generation business, or dismissed them as irrelevant, even when it became increasingly obvious that conventional energy generation was heading down a dead-end road.

What became particularly evident in the cases of Gamma and Delta, as well as Alpha and Beta, was that strategic options, for example the opportunity to enter the more future-oriented energy-related service business, were repeatedly faded out until no or very few alternatives were available.

Group C. By contrast, what really drove the development of Epsilon and Zeta, at least from the second half of Phase II, was that both companies continuously created new alternative options. Moreover, opportunities as well as existing businesses were constantly evaluated with respect to their future viability in an increasingly dynamic and uncertain market, and both Epsilon and Zeta were not afraid to refrain from existing and at the time profitable business areas.

Thus, whereas the group A and group B firms still adhere to the same path of conventional energy generation today, the group C firms were able to abandon their conventional

energy generation paths in the early years of Phase III, and despite strong arguments supporting the continuation of this business segment. Thus, Epsilon and Zeta overcame self-reinforcing mechanisms and switched to the path of renewable energies, which soon became much more profitable and future-oriented.

Epsilon's and Zeta's second change in strategic direction was even more remarkable. In the second half of Phase IV, both companies again perceived ongoing changes in the development of the German energy market, this time with respect to renewable energy generation. As a consequence, both companies switched their focus to the energy-related services business while terminating any further investments in the renewable energies business, which at that time was their core business. Thereby, both firms were again able to overcome self-reinforcing mechanisms that provided a strong motivation to adhere to their renewable energy paths. For example, both companies established the necessary structures, processes, and competencies that were required to be successful in this market segment. Thus, the development of Epsilon and Zeta emphasized their ability to overcome strong influencing factors and to undertake organizational adaptation, even within a state of path dependence.

6.4. THE INFLUENCE OF LUCK

Besides the abovementioned self-reinforcing mechanisms that influenced the focal firms' development paths, the cases highlighted another influencing factor on the firms' development that might be designated as luck. Indeed, luck could be observed in the development of Beta as well as Epsilon and Zeta.

In the case of Beta, the company had to reduce its German conventional energy generation capacities due to a decision of the European Competition Commission, as was already apparent in the early stages of Phase II (2006). In retrospect, this could have been a lucky coincidence for Beta, because at the time, market development in the conventional energy generation business had become more and more dynamic and uncertain, while on the other hand, renewable energies had increasingly become a reasonable investment alternative, particularly due to guaranteed feed-in remunerations for solar and wind power.

Indeed, Beta took this opportunity to enter the renewable energies business, later accompanied by large-scale investments in on- and offshore wind farms. However, the company did not undertake strategic change. Renewable energies were always only considered as a supplement to conventional energy generation, as the company's major focus remained on its traditional core business of conventional energy generation. Thus, despite this opportunity, Beta ended up in a financially tense situation due to its overemphasis on conventional energy generation.

Conversely to Beta, which entered the renewable energies business but has not refrained from its conventional energy generation business, both Epsilon and Zeta used lucky coincidences to realign themselves and to embark on a new developmental direction. Driven by self-reinforcing mechanisms, Epsilon intended to further increase its conventional energy generation capacities and therefore planned to build a new coal power plant in 2005. However, as a consequence of the financial crisis, one of the mandated banks adapted its internal lending guidelines and withdrew from financing Epsilon's power plant at the end of Phase II (2008). Although there were strong incentives

to continue this conventional energy generation project – including other less risk-averse banks if necessary – Epsilon decided to suspend the project before entering its second construction phase. Instead of further strengthening its conventional energy generation business, the company entered the renewable energies business. In 2010, Epsilon even divested its entire conventional energy generation capacities to focus exclusively on renewable energies. In retrospect, the withdrawal of this mandated bank was fortunate for Epsilon, as in the following phases, conventional power plants increasingly became a curse for their owners, while renewable energies became a blessing. Thus, through entering and further developing the path of renewable energies and breaking with the conventional path, Epsilon today finds itself in a superior situation compared to the group A and group B firms.

Zeta's situation was similar. In 2008, the company decided to enter the energy generation business in order to strengthen its core business. Thus, Zeta acquired corresponding properties on which a gas power plant was to be built. However, the construction of this gas power plant could not be realized *"for other reasons,"* according to the company's CEO. Given that in the following years the profitability of conventional energy generation dramatically decreased, this proved a lucky escape for Zeta. Crucially, the company also made effective decisions. Indeed, it continued with its strategy to enter the energy generation business, but instead of entering the conventional energy generation path, it focused on renewable energies. Certainly, at the beginning of Phase III, Zeta undertook major investments in renewable energies to strengthen its footprint in this type of energy generation, which in turn confirmed its development path.

6.5. OVERCOMING SELF-REINFORCING EFFECTS

Although the companies' development paths were subject to self-reinforcing mechanisms in different dimensions, manifestations, and intensities, one could observe Alpha, Gamma, and particularly both group C firms Epsilon and Zeta being able to consciously overcome the stabilizing influences of self-reinforcing mechanisms. Epsilon and Zeta were even able to break their development paths twice while focusing on new, more future-oriented businesses. Table 12 highlights the particular actions taken by Alpha, Gamma, Epsilon and Zeta in order to overcome self-reinforcing effects.

In the case of Alpha, one could observe the company overcoming learning, coordination, and expectation effects in three specific ways. First, instead of further improving the efficiency levels of its conventional power plants, as Alpha did over the years, the company decided in 2012 to shut down all coal power plants that no longer met the company's efficiency standards. In this way, Alpha was able to overcome one dimension of learning effects, affording it a little more air to breathe in terms of financial resources.

Second, whereas over the years the company was driven by a highly centralized process of decision making, in 2014 Alpha faced the necessity to reduce hierarchical thinking and develop critical faculties in order to become more flexible to market changes. Thus, Alpha successfully overcame a coordination effect in the new dimension of formal authority.

Table 12: Overcoming Self-Reinforcing Effects

Focal Firms	Scale Effects	Complementary Effects	Learning Effects	Coordination Effects	Expectation Effects
Group A Alpha	–	–	Effiency improvements • Shutting down inefficient conventional power plants *(instead of further improving the efficiency levels of those power plants)*	Formal authority (NEW) • Reducing hierarchical thinking and developing critical faculties *(instead of futher establishing hierarchical structures)*	Pressure on deviations from group consensus (NEW) • Listening to new ideas and discussing without ideologically initiated prohibitions *(instead of dismissing opposing opinions as being false or denouncing them as being dubious)*
Group B Gamma	Economies of scale • Diversifying the energy generation portfolio to achieve a higher level of flexibility and reduce risks *(instead of further strivng to realize synergy potentials and cost degression through larger energy generation units)*	–	–	–	–
Group C Epsilon	–	Growth opportunities in adjacent areas • Challenging existing investments *(instead of further expanding the business into adjacent and complementary business areas)*	–	Centralization • Decentralizing activities in favor of flexibility and agility while consciously sacrificing control *(instead of further improving control through centralizing activities)* Planning, budgeting, and goal setting • Consciously challenging existing investment scenarios and taking into account changing assumptions *(instead of blindly believing in once established scenarios for decision-making)*	Collective rationalization (NEW) • Perceiving changes and signals with respect to ongoing market changes and acting on them *(instead of discounting warnings and weak signals as being not relevant)* Pressure on deviations from group consensus (NEW) • Engaging employees to report perceived risks and misdevelopments *(instead of dismissing opposing opinions as being false or denouncing them as being dubious)*

Table 12: Overcoming Self-Reinforcing Effects *(continued)*

Focal Firms	Scale Effects	Complementary Effects	Learning Effects	Coordination Effects	Expectation Effects
Zeta	–	–	Routinization of activities (NEW) • Proactively challenging existing routines (instead of adhering to familiar and historically proven processes)	Formalization and standardization • Continuously challenging existing investment criteria in order to not excluding strategically important investments a priori *(instead of following strict and binding investment criteria and guidelines)* Planning, budgeting, and goal setting • Consciously challenging existing investment scenarios and taking into account changing assumptions *(instead of blindly believing in once established scenarios for decision-making)* • Considering assumptions as subjective evaluations *(instead of understanding them as objective knowledge)* Formal authority (NEW) • Reducing hierarchical thinking and developing critical faculties *(instead of futher establishing hierarchical structures)*	Collective rationalization (NEW) • Perceiving changes and signals with respect to ongoing market changes and acting on them *(instead of discounting warnings and weak signals as being not relevant)*

Third, in the same year, Alpha perceived the necessity to become more amenable to new ideas and impulses, even though they might challenge predominant ways of thinking, for example with respect to Alpha's conventional energy generation business. Thus, instead of further exerting pressure on divergent opinions, it decided to listen to and discuss new ideas without ideologically initiated prohibitions. Thereby, Alpha was able to overcome one new dimension of expectation effects, i.e., one symptom of groupthink.

Nevertheless, it must be mentioned that Alpha's particular actions to overcome self-reinforcing effects were driven more by a pressure to change than by a strategic purpose. Moreover, those actions only took place in Phase IV and thus it was actually too late for Alpha to free itself from a situation of strategic lock-in.

Similarly, the case of Gamma highlighted a company being able to overcome scale effects. Over the years, Gamma's energy generation strategy was mainly focused on gas power plants and offshore wind farms, which produce large quantities of energy and are hence much more profitable than single wind turbines. However, at the end of Phase IV (2014), the company shifted its focus toward flexibility and risk reduction at the expense of profitability, enabling it to overcome scale effects in the form of economies of scale. Instead of further striving to realize synergy potentials and cost degression through larger energy generation units, Gamma decided to diversify its energy generation portfolio in order to become more flexible and to reduce the risks arising from focusing on single energy generation sources. Nevertheless, as this shift in energy generation only occurred in 2014, it was also too late for Gamma to free itself from a situation of strategic lock-in.

Whereas in the abovementioned cases of Alpha and Gamma, the companies were able to overcome the stabilizing influences of self-reinforcing effects but continued to adhere to the same development paths, the cases of Epsilon and Zeta illustrated an ability not only to overcome self-reinforcing mechanisms but also to break existing development paths while entering new paths. Moreover, for Alpha and Gamma, overcoming self-reinforcing mechanisms could only be observed in Phase IV. Thus, it was mainly increased external pressure that stimulated Alpha and Gamma to change their existing patterns: they simply had to change. By contrast, at Epsilon and Zeta, one could observe actions to overcome self-reinforcing mechanisms throughout the entire period of observation, i.e., from Phase I to Phase IV.

At Epsilon, one could observe the company undertaking actions to overcome complementary and coordination effects as well as expectation effects in different dimensions. First, as early as Phase I (2003) Epsilon began challenging existing investments instead of further expanding its business scope into adjacent and complementary business areas. With this particular action, Epsilon not only overcame complementary effects in terms of realizing growth opportunities in adjacent areas, but protected itself from building up interdependencies that would limit its flexibility in the future.

Second, while one could observe coordination effects in the form of centralizing activities at all focal firms, in Phase I (2002) Epsilon decentralized activities in favor of flexibility and agility. Thus, the company sacrificed a certain amount of control and influence over the activities of its divisions, but the flexibility gained helped it to continually realign itself in later phases. Third, Epsilon was able to overcome the self-reinforcing

mechanisms of planning, budgeting, and goal setting, constituting another dimension of coordination effects. Instead of blindly believing in previously established scenarios for decision making, as could be observed particularly at Alpha and Gamma, Epsilon consciously challenged existing investment scenarios and took into account changing assumptions, with respect to potential investments in both conventional and renewable energies. Although Epsilon thus lost a certain degree of stability for planning and decision making, these actions helped the company to shift the focus of its entire energy generation strategy twice. Due to significant legal and political changes at the end of Phase III and hence constantly changing assumptions in its investment scenarios, Epsilon decided to adhere to its earlier decision to leave the conventional energy generation business. Similarly, in 2012 Epsilon opted to reduce its expansion speed in the renewable energies field of solar energy, for which it perceived ongoing changes in feed-in remunerations, which would result in a profitability decrease.

Fourth, Epsilon was able to overcome aspects of groupthink, representing new dimensions of expectation effects. Epsilon perceived even weak signals that suggested ongoing changes in the market, and quickly acted on them. Whereas this dimension of expectation effects particularly influenced the development of the group A and group B firms, where one could observe the companies deeming warnings and weak signals as irrelevant and thus recommitting to past activity patterns, Epsilon (and Zeta) were able to constantly reconsider their decisions and activities in the face of perceived change. This became particularly obvious in 2010 (Phase III), when Epsilon undertook a strategic realignment toward renewable energies while turning away from conventional energy generation. In 2013/2014 (Phase IV), Epsilon's capability to overcome this dimension of

expectation effects became even more evident, as the company perceived signals that the profitability of renewable energies might decrease and, as a result, decelerated the further expansion of its renewable energy capacities.

Fifth and similar to Alpha, Epsilon was able to overcome another expectation effect that occurred as an additional new dimension of groupthink. Whereas other focal firms exerted pressure on deviations from group consensus through dismissing opposing opinions as false or dubious in order to avoid having to reconsider their behavioral patterns, Epsilon engaged its employees to report perceived market changes and threatening developments. With this particular action, Epsilon laid an important foundation for becoming open-minded to new ideas and impulses, and thus became more flexible and adaptable in later stages of its development.

Similar to the development of Epsilon, one could observe Zeta undertaking particular actions to overcome learning, coordination, and expectation effects in various dimensions throughout Phases II to IV. First, Zeta was able to overcome one new dimension of learning effects, that is, the routinization of activities. Thus, instead of adhering to familiar and historically proven processes and activity patterns, which may have been deemed favorable for reasons of stability and efficiency, Zeta proactively and continuously challenged existing routines. Thus, Zeta not only became capable of challenging but also of adjusting its behavioral patterns. Consequently, it became able to change, even when confronted with stabilizing mechanisms in the form of the self-reinforcing effects at play.

Second, Zeta was capable of overcoming formalization and standardization as one dimension of coordination effects. In contrast to the cases of Alpha, Beta, Gamma, and Delta – focal firms that followed strict and binding investment criteria and guidelines that excluded renewable energies and the energy-related service business from consideration due to insufficient expected returns – Zeta continuously challenged existing investment criteria in order to avoid excluding strategically relevant investments *a priori*. This became particularly obvious in 2011 (Phase IV), when Zeta entered a new path with the energy-related services business.

Third, Zeta successfully overcame another dimension of coordination effects, that is, planning, budgeting, and goal setting, in two different manifestations. On the one hand, the company consciously challenged existing investment scenarios as the basis for investment decisions instead of blindly believing in previously established scenarios for decision making. This came into effect in 2012 (Phase IV), when Zeta did not exhaust its investment budget for solar power due to perceived ongoing changes in the framework conditions for this form of renewable energy. As a consequence, within its renewable energies business, Zeta reallocated resources from solar to wind power as a more profitable source of renewable energy generation. On the other hand, rather than understanding assumptions within its planning scenarios as objective knowledge, as could be observed in the cases of Beta and Delta, Zeta was fully aware that planning assumptions are the result of various subjective evaluations and are thus subject to change. Accordingly, the company accepted uncertainties and ambiguities within the decision-making process instead of defaulting to historic tendencies. Both actions enabled

Zeta to overcome the stabilizing influences of self-reinforcing effects and enter new developmental directions.

Fourth, the particular actions taken by Zeta allowed the company to overcome a coordination effect in the new dimension of formal authority. Thus, the company recognized the need to reduce hierarchical thinking and develop critical faculties. In contrast to the development of Beta, for example, which even in 2011 further intensified hierarchical structures and assigned clear decision-making authority at the top level, Zeta decentralized its decision-making process in 2012 (Phase IV). In this way, it became more flexible to quickly capture emerging market opportunities.

Finally, Zeta was able to overcome collective rationalization, a new dimension of expectation effects. Thus, Zeta was capable of perceiving weak signals in the development of the energy market and transforming them into concrete actions. Conversely to the group A and group B firms, which were all subject to such stabilizing forces and thereby discounted warnings and weak signals as irrelevant while continuously recommitting to past activity patterns, at Zeta one could observe the company continuously reconsidering its assumptions and proactively initiating adaptations. Zeta's overcoming of these expectation effects became particularly obvious in three incidents, which had a strong influence on the company's development.

In 2010 (Phase III), Zeta undertook a large-scale investment program to accelerate the expansion of renewable energies, recognizing that the German energy market was significantly changing from centralized to decentralized energy generation. At the beginning of Phase IV, the company's capability to overcome the stabilizing forces of

expectation effects became even more evident. Thus, in 2011 Zeta acknowledged that the energy market's future development would be subject to considerable uncertainties that would render it difficult for the company to sustain long-term prosperity. Even in the field of renewable energies, Zeta noticed signals that the framework conditions for solar power were about to change. As a consequence, Zeta shifted its focus in renewable energy generation toward wind power in the first place. However, three years later, the company also recognized changing framework conditions in the area of wind power, encouraging it to completely shift its focus toward activities outside its core business, in particular toward the energy-related services business. As Zeta had already built up its own project planning capacities for wind power projects, it would have been seen as highly beneficial to stick to the strategy of further expanding its wind power capacities. However, Zeta resisted such short-term benefits, and consciously overcame the influence of self-reinforcing effects. The company thus broke its renewable energy path while entering a new path in the energy-related services business.

7. DISCUSSION

It doesn't matter how beautiful your theory is, it doesn't matter how smart you are. If it doesn't agree with experiment, it's wrong.

Richard P. Feynman

7.1. SELF-REINFORCING MECHANISMS: WHAT ARE THEY?

The literature on organizational path dependence has identified five distinct self-reinforcing mechanisms as the driving forces of organizational persistence through stabilizing and automatizing the collective activity patterns of the organization (Sydow et al. 2009). According to previous research, these self-reinforcing mechanisms are scale, complementary, learning, coordination, and expectation effects (Sydow et al. 2009; Apajalahti and Lovio 2012). The literature has argued that these effects unnoticeably gain control of the developmental process and thus shape companies' development paths (Schreyoegg and Kliesch-Eberl 2007; Schreyoegg et al. 2011; Schreyoegg and Sydow 2012). Therefore, self-reinforcing mechanisms impede organizational adaptation and stimulate companies to adhere to a once entered path of development.

However, the findings presented in this dissertation suggest a reconsideration of some of the key theoretical assumptions of self-reinforcing mechanisms and hence the theory of organizational path dependence as proposed by Sydow et al. (2009). This is particularly true with respect to three perspectives: the underlying dynamics of self-reinforcing mechanisms; the limiting effect on the scope of alternatives; and finally and foremost, the

influence of managerial agency. Figure 12 highlights the critical assumptions that are challenged by the qualitative findings of this dissertation.

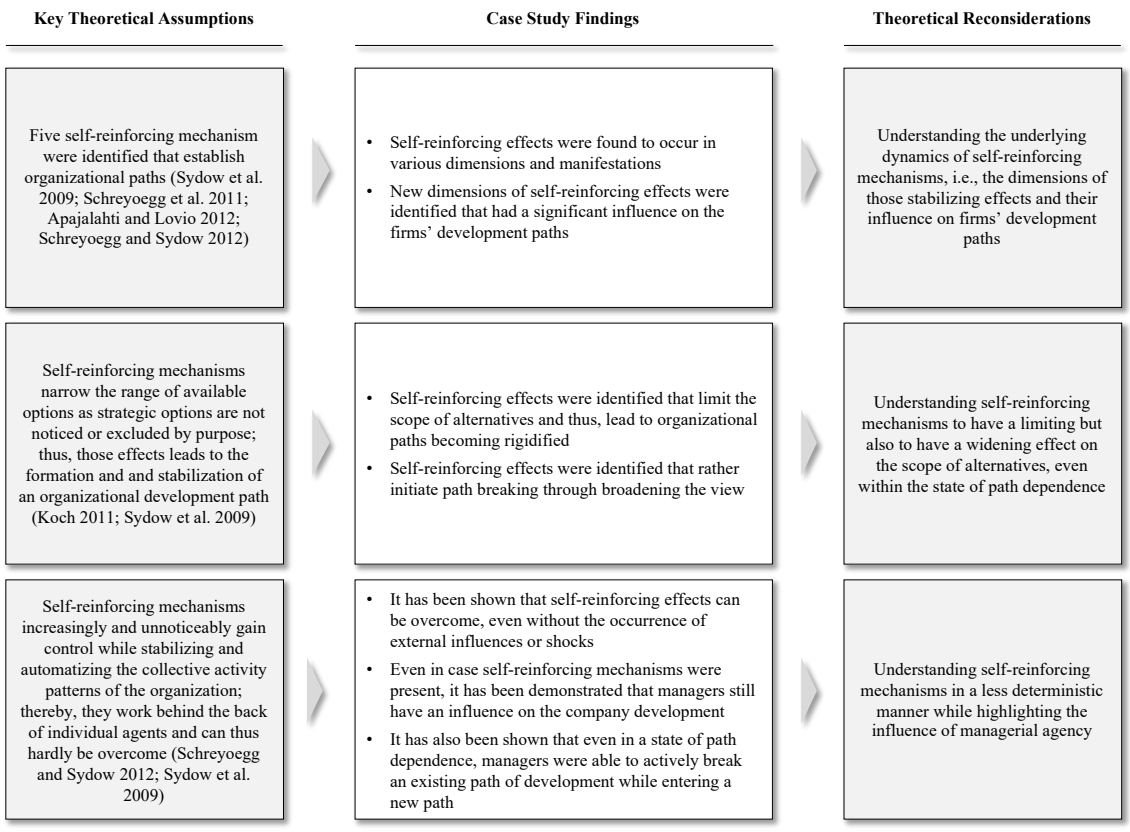

Figure 12: Reconsidering Key Theoretical Assumptions

The implications of the respective findings on the theory of path dependence and the concept of self-reinforcing mechanisms are discussed in the following sub-chapters.

7.1.1. THE UNDERLYING DYNAMICS OF SELF-REINFORCING MECHANISMS

According to previous literature in the field of organizational path dependence, five self-reinforcing mechanisms can be distinguished that force organizations to adhere to a once entered path of development (Sydow et al. 2009; Schreyoegg et al. 2011; Apajalahti and Lovio 2012; Schreyoegg and Sydow 2012). However, 20 years after Sydow et al.'s (2009) seminal work on organizational path dependence and despite an accumulation of case studies on path dependence (Vergne 2013), a clear understanding of the self-reinforcing mechanisms underlying the constitution of organizational path dependence remains lacking (Sydow et al. 2009; Schreyoegg et al. 2011; Vergne and Durand 2010; Vergne 2013). Consequently, unpacking these self-reinforcing mechanisms in practice (Sydow et al. 2009; Schreyoegg et al. 2011) is necessary in order to develop a clear conception of which components of these driving dynamics are at play in impeding organizational adaptation, keeping organizations on a once entered development path as a result (Vergne and Durand 2010).

Hence, taking a deep dive into these mechanisms' modes of action in order to establish an understanding of the underlying dynamics of self-reinforcing mechanisms has become a priority to advance research on organizational path dependence. To this end, the findings presented in this dissertation enhance understanding of the underlying dynamics of self-reinforcing mechanisms. Existing literature in the field has focused on self-reinforcing mechanisms from a superordinate perspective while distinguishing between scale, complementary, learning, coordination, and expectation effects (Sydow et al. 2009; Schreyoegg et al. 2011; Apajalahti and Lovio 2012; Schreyoegg and Sydow 2012). Thereby, existing literature has already uncovered certain underlying dimensions of these

self-reinforcing effects as explained above. However, during the case analyses presented here, further dimensions of learning, coordination, and particularly of expectation effects emerged that increase understanding of how such mechanisms prevent organizational adaptation and keep firms on once entered development paths. Table 13 outlines both the existing and the new dimensions of self-reinforcing effects.

Self-reinforcing Mechanism	Existing Dimensions	New Dimensions
Scale effects	• Economies of scale • Economies of scope	–
Complementary effects	• Growth opportunities in adjacent areas • Shared resources	–
Learning effects	• Efficiency improvements • Exploiting existing business areas	• Improvement of existing competencies, i.e., strengthening existing competencies, or further developing existing competencies and technologies • Routinization of activities, i.e. adhering to familiar and proven processes
Coordination effects	• Centralization • Formalization and stanardization • Planning, budgeting, and goal setting	• Formal authority, i.e., establishing hierarchical structures and clear roles and responsibilities, or assigning clear decision-making authority at the top level
Expectation effects	• Social expectations • Aspiration for social belonging • Being on the winning side • Informal and unwritten norms • Legitimacy seeking	• Illusion of invulnerability, i.e., being excessively optimistic (regarding the own situation), or feeding like being the competence leader and part of an elite • Collective rationalization, i.e., discounting warnings and weak signals as being not relevant • Pressure on deviations from group consensus, i.e., dismissing opposing opinions as being false or denouncing them as being dubious, or even downgrading dissents • Self-censorship of deviations from group consensus, i.e., suppressing counterarguments

Table 13: Existing versus New Dimensions of Self-Reinforcing Mechanisms

Thus, besides efficiency improvements and a focus on exploiting existing business areas, learning effects also become visible as companies focus on continuously improving existing competencies instead of learning new ones. This first new dimension of learning effects additionally arises from an inherent tendency toward exploitative learning at the

expense of exploratory learning (March 1991; Levinthal and March 1993; Raisch and Birkinshaw 2008; Raisch et al. 2009). Accordingly, the emphasis on exploitation through the improvement of competencies in existing processes and procedures increasingly renders experimentation with new procedures less attractive (Levitt and March 1988; March 1991). A second dimension of learning effects that became evident during the case analyses is the routinization of activities. Thereby, adhering to existing routines in terms of familiar and historically proven processes represents another element deeply rooted in the exploitation tendencies of an organization (Baum et al. 2000; Raisch and Birkinshaw 2008).

With respect to coordination effects, the findings presented in this dissertation suggest the addition of a new dimension to the existing understanding of this self-reinforcing effect. Thus, besides centralization, formalization and standardization, and planning, budgeting and goal setting, researchers are advised to consider formal authority as a fourth underlying dimension of coordination effects that was found to play a critical role in adhering these organizations to their once entered path of development. This suggestion is in line with respective literature on coordination stating that formal authority represents one key formal mechanism of coordination that determines whether decision-making authorities are located at higher or lower level hierarchical structures (Pugh et al. 1968; Martinez and Jarillo 1989).

Finally, the findings presented in this dissertation suggest complementing the underlying dimensions of expectation effects with the symptoms of groupthink (Janis 1972, 1971; Montanari and Moorhead 1986, 1989). According to the literature, groupthink in the context of decision making describes the presence of certain antecedent conditions that

increase the likelihood of people making poor-quality decisions due to the attitudes and the behaviors they develop by following a certain group (Janis 1971, 1972). The occurrence of groupthink can be identified via certain symptoms that in turn promote observable defects in decision-making processes and are likely to result in poor-quality decisions (Moorhead and Montanari 1986). Previous studies by Janis (1971, 1972) and Moorhead and Montanari (1986, 1989) have identified eight symptoms of groupthink, with the case studies presented here bringing to light four that limited the focal firms' ability to undergo organizational adaptation, thereby keeping them on their once entered development paths. These four symptoms were: First, an illusion of invulnerability that created excessive optimism regarding a company's own situation as well as a self-conception of being competence leaders and part of an elite; second, collective efforts to rationalize that resulted in dismissing warnings and weak signals as irrelevant; third, direct pressure on deviations from group consensus, that is, dismissing opposing opinions as being false, denouncing them as being dubious, or even downgrading dissents; and fourth, self-censorship of deviations from group consensus that resulted in employees suppressing their doubts and counterarguments, which would possibly have led to path-breaking behavior.

The remaining four symptoms of groupthink could not be identified in the development of the six focal firms. These dimensions are: An unquestioned belief in the group's inherent morality, which inclines members to ignore the ethical and moral consequences of decisions; stereotyped views of enemy leaders as too evil to warrant genuine attempts to negotiate, or as too weak or stupid to counter whatever risky attempts are made to defeat their purposes; a shared illusion of unanimity concerning judgments conforming

to the majority view (partly resulting from self-censorship of deviations, augmented by the false assumption that silence means consent); and finally, the emergence of self-appointed mindguards, that is, members who protect the group from adverse information that might shatter their shared complacency about the effectiveness and the morality of their decisions (Janis 1971, pp. 85–88; Montanari and Moorhead 1989, pp. 210–211).

Nevertheless, not finding evidence for the presence of these remaining dimensions of groupthink does not necessary imply that they did not have an influence on the focal firms' development. Rather, groupthink symptoms represent feelings, beliefs, or behaviors among group members, and thus the most appropriate way to measure the phenomenon is to ask the group members themselves (Esser 1998). Moreover, according to Park (1990), the phenomenon of groupthink can scarcely be assessed by an outside observer. Therefore, in order to identify the remaining four dimensions of groupthink, a different methodological approach would have to be applied, particularly including observations. Thus, it might constitute a promising avenue for future research to focus on the influence of expectation effects on firms' development paths.

In order to develop a profound understanding of self-reinforcing mechanisms' modes of action and how they impede organizational adaptation, the findings presented in this dissertation clearly suggest a more detailed perspective on the underlying dimensions of scale, complementary, learning, coordination, and expectation effects, thereby broadening the perspective with respect to the various dimensions that shape such self-reinforcing mechanisms. Accordingly, this dissertation suggests reconsidering the level of analysis.

7.1.2. WIDENING THE SCOPE OF ALTERNATIVES

The literature argues that in the state of path dependence, self-reinforcing mechanisms have a stabilizing effect on the collective activity patterns of an organization while adhering it to a particular development path (Sydow et al. 2009; Vergne and Durand 2011). Thus, it has been argued that self-reinforcing mechanisms constantly narrow the range of available alternative options, as they are not perceived due to a focus on existing paths, or they are not taken into consideration, i.e., they are excluded on purpose (Sydow et al. 2009; Koch 2011). Consequently, such behavior results in a state of strategic lock-in that is characterized by a drastically reduced range of available options (Koch 2011).

On the one hand, the majority of self-reinforcing mechanisms could be identified to limit the scope of alternative options and thus render organizational paths more rigid. These qualitative findings are in line with previous literature on organizational path dependence (Sydow et al. 2009; Schreyoegg and Sydow 2012) and provide substantial empirical evidence for the stabilizing effects of self-reinforcing mechanisms, while filling a research gap in the path dependence literature recently identified by Vergne (2013).

However, on the other hand, the findings presented in this dissertation also indicate that self-reinforcing mechanisms do not necessarily limit the scope of alternatives available to firms, even where those included in this study were already found to be operating in a state of path dependence. Table 14 provides an overview of the respective complementary, learning, and expectation effects and their dimensions and manifestations that enabled the focal firms to access new paths.

Self-reinforcing Mechanism	Dimension	Manifestation	Effect on the Scope of Alternatives		
			Limiting Effect	Both Limiting and Widening Effect	Widening Effect
Complementary effects	Growth opportunities in adjacent areas	Expanding the business into adjacent business areas	–	–	Beta, Gamma & Delta, and Epsilon & Zeta
Learning effects	Exploiting existing business areas	Exploiting existing competencies by focusing on proven technologies of conventional energy generation	Alpha & Beta, and Delta	Gamma	–
Expectation effects	Social expectations	Fulfilling stakeholders‘ expectations (e.g. population, shareholder)	–	Alpha	–

Table 14: Self-Reinforcing Mechanisms Widening the Scope of Alternatives

First, in contrast to previous literature, this dissertation has identified complementary effects in the dimension of organizations searching for growth opportunities in adjacent areas to have a positive effect on the focal firms' ability to break collective activity patterns. Rather than narrowing the scope of alternatives, this dimension of complementary effects actually facilitated the focal firms' search for adjacent areas and allowed them to enter new development paths. This widening effect on the scope of alternatives could be observed even in the group A (except for Alpha) and group B firms. In all cases in which this dimension and manifestation of complementary effects appeared, firms entering an additional path of energy-related services could be observed. As the case studies have demonstrated, the presence of this dimension of complementary effects provided a motivation for diversification (Pehrsson 2006). Thus, this specific type of complementary effect resulted in the expansion of the business scope into adjacent

business areas (Stimpert and Duhaime 1997) through empowering the firms to identify and perceive new market opportunities.

Second, the case study findings provide evidence for learning effects in the form of exploiting existing competencies to have a reinforcing effect on the focal firms' existing development paths, as learning new competencies becomes increasingly unattractive (Baum et al. 2000; Raisch and Birkinshaw 2008). This effect could be observed at Alpha, Beta, Gamma and Delta. Nevertheless, at Gamma, the presence of this dimension of learning effects also initiated the company to enter a new development path. Gamma applied its existing competencies in conventional energy generation to the field of renewable energies. Accordingly, focusing on existing competencies in certain business areas not only encourages firms to further focus on the same business areas, but also to identify new business areas in which those competencies can be applied.

Third, expectation effects in the form of social expectations were found to have a stabilizing influence on the focal firms' activity patterns and thus reinforced their development paths. Therefore, the findings support previous literature arguing that social expectations constitute appropriate behavior (O'Reilly 1989), which as a consequence leads to increasingly stabilized activity patterns that become more and more difficult to reverse. One could particularly observe social expectations in terms of fulfilling stakeholders' expectations to have a limiting effect on the scope of alternatives in the case of Alpha. This company thus justified its decision to accelerate its conventional energy generation capacities by its customers' expectations of secured energy supply, which according to its understanding could only be guaranteed by the use of conventional power

plants. As a result, alternative options that might have been more advantageous in the long term were overlooked.

However, social expectations also appeared to have a widening effect on the scope of alternatives and even in a state of path dependence, challenging the understanding of expectation effects put forward by previous literature on organizational path dependence (Sydow et al. 2009; Schreyoegg and Sydow 2012). In fact, the widening effect of this type of expectation effect could also be observed in the case of Alpha. Although the company still adhered to its path of conventional energy generation, the presence of certain market expectations also drove it to invest in renewable energy generation, and hence to establish another development path that it continues to follow today. In this context, the limiting character of self-reinforcing mechanisms in the form of expectation effects was reversed, while empowering the focal firm to seize new market opportunities in the field of renewable energies.

Accordingly, the findings presented in this dissertation with respect to the widening effect of certain self-reinforcing mechanisms on the firms' development suggest a reconsideration of the influencing factors at play. Self-reinforcing mechanisms do not necessarily reinforce development paths. Rather, they should be understood as either narrowing or widening the scope of alternatives available to a firm, even within a state of path dependence, but depending on the particular context in which they appear.

7.1.3. THE INFLUENCE OF MANAGERIAL AGENCY

The findings of this dissertation, in particular with respect to the focal firms Alpha, Beta, Gamma, and Delta, strongly substantiate the classic theory of organizational path dependence established by Sydow et al. (2009). Thus, one could observe the abovementioned focal firms adhering to a path of development driven by the influence of self-reinforcing mechanisms (Sydow et al. 2009; Schreyoegg and Sydow 2012). Thereby, self-reinforcing effects in the gestalt of scale, complementary, learning, coordination, and expectation effects led to an increase in profitability and operating efficiency in the first place (Levinthal and March 1993; Gilbert 2005; Apajalahti and Lovio 2012), and thus induced a replication of those successful activity patterns, which increasingly became stabilized and automatized (Sydow et al. 2009). As a consequence, the firms' development paths became more and more rigid as the firms stuck to the same activity patterns. This phenomenon provides strong evidence for the argumentation of Schreyoegg and Kliesch-Eberl (2007, p. 916), arguing that such activity patterns *"become fixed to the constellations in which they proved to be successful."*

Taking coordination effects in the dimension of formalization and standardization as an example, one could observe Alpha, Beta, Gamma and Delta following strict and binding investment criteria and guidelines that excluded almost all potential investment areas from consideration, except conventional energy generation. Under the given circumstances at the time, profitability targets could simply not be met with investments in renewable energies, energy-related services, or even other potential investment areas beyond conventional energy generation. Setting this profitability threshold for every new investment rendered the focal firms highly efficient in terms of both decision making and

resource allocation. As a consequence, the focal firms invested in conventional energy generation, which represented a highly profitable business segment, even up to the point at which renewable energies increasingly gained importance.

As the market began to change, these formerly successful investments increasingly suffered negative outcomes in terms of decreasing profitability and operating profits. However, the focal firms became less and less able to change their activity patterns, as the unintended dynamics of self-reinforcing mechanisms unconsciously controlled and stabilized their organizational processes (Schreyoegg et al. 2011; Schreyoegg and Sydow 2012). That is, the decreasing profitability of conventional power plants did not stimulate the focal firms to reconsider their investment criteria, but rather to raise the profitability threshold for future investments, as their financial situations became more and more tense. Consequently, the companies' persistence in adhering to the same activities narrowed the scope of alternatives available and led them into a state of strategic lock-in (Koch 2011).

While referring to the abovementioned example, as renewable energies became an indispensable source of energy generation, again accelerated by political decisions at the end of Phase II, the profitability thresholds of the focal firms still disqualified investments in renewable energies. Alpha, Beta, Gamma and Delta did not recognize that the high profitability targets from past decades were simply no longer applicable, particularly not with investments in conventional power plants. The companies nevertheless relied on historically proven investment returns achieved via conventional energy generation that had met the profitability threshold, and as a consequence, further invested in conventional energy generation. Thereby, changing market requirements were not taken into

consideration, while their development paths became increasingly stabilized. As market change accelerated and conventional power plants were no longer profitable, the focal firms were tied to their loss-making assets while lacking the necessary financial resources to undergo change.

Up to a certain point, this development also applied to the group C firms Epsilon and Zeta. However, the cases of both Epsilon and Zeta demonstrated that despite the presence of self-reinforcing effects that provided strong incentives to further pursue their once entered development paths, these focal firms were capable of overcoming these stabilizing forces in order to enter a new path of development. In particular, Epsilon was able to break its path of conventional energy generation while establishing an alternative path by focusing on renewable energies in Phase III. In Phase IV, both Epsilon and Zeta actually succeeded in consciously overcoming self-reinforcing effects and terminated any further investments in renewable energies while focusing on becoming a service firm. Although Epsilon and Zeta did not completely abandon their existing renewable energy generation capacities at that point in time, such as through divestitures, their behavior could still be described as path-breaking. Both firms again entered a new path of energy-related services that continues to accelerate even today.

According to literature, without the occurrence of exogenous shocks or at least a *"second-order observation,"* organizational paths cannot deliberately be escaped as the idea of path breaking contradicts the definition of path dependence (Sydow et al. 2009, p. 702). Thus, in the process of path dependence, it is assumed that actors continuously lose influence over the development of the firm, while self-reinforcing mechanisms increasingly assume control (Sydow et al. 2009; Schreyoegg and Sydow 2012). In fact,

in this sense it would be contradictory to assume that the same actors reflect on hidden dynamics and change their course of action (Sydow et al. 2009).

However, besides the cases of Epsilon and Zeta, which have demonstrated path-breaking behavior, even in the development of Alpha and Gamma, one could observe the two focal firms being able to overcome scale, learning, coordination, and expectation effects at some points in time. Although Alpha and Gamma were not able to break their paths of conventional energy generation, the findings have nevertheless highlighted their capacities to consciously overcome self-reinforcing mechanisms, even without the occurrence of external influential factors, i.e., external shocks or disturbances.

Thus, the findings of this dissertation strongly challenge the idea of *"self-reinforcing"* mechanisms being irreversible by corporate actors and leading to organizations' increasingly stabilized activity patterns (Sydow et al. 2009; Schreyoegg and Sydow 2012), culminating in a state of strategic lock-in (Koch 2011). Hence, the question arises of what actually are these influential factors? On the basis of the insights generated by the case studies and particularly those of Epsilon and Zeta, the findings suggest a reconceptualization of scale, complementary, learning, coordination, and expectation effects. So-called self-reinforcing mechanisms should rather be understood as temporal influences on firms' strategic initiatives that appear to have either a widening or a limiting effect on the scope of alternatives available to an organization, depending on the contextual situation.

Thereby, the findings not only encourage a reconceptualization of self-reinforcing mechanisms, but rather challenge a basic assumption of the concept of organizational

path dependence (Sydow et al. 2009; Schreyoegg and Sydow 2012). If there is no *"self-reinforcement"* of the driving forces of path dependence – understood as an organizational development in which the range of available alternatives continuously decreases (Sydow et al. 2009; Koch 2011; Apajalahti and Lovio 2012) – then the concept of path dependence in fact loses its deterministic character (David 1985; Arthur 1990, 1989). Whereas the path dependence literature argues that self-reinforcing dynamics work behind the backs of individual agents (Giddens 1984; Schreyoegg and Sydow 2012) and increasingly and unnoticeably assume control of firms' developmental processes, the findings of this dissertation rather highlight the influence of managerial agency, even in a state in which such mechanisms are already at play. Although self-reinforcing mechanisms provide strong incentives to adhere to a certain path of development, managers seem to remain in the driver's seat.

By emphasizing the path-breaking potential of firms even without the occurrence of external disturbances, the case study findings shed light on the *"problematic coexistence of path irreversibility and managerial intentionality"* (Vergne and Durand 2011, p. 365). Self-reinforcing mechanisms do not automatically lead to fixed activity patterns and prevent organizational adaptation. As the case studies of Epsilon and Zeta have demonstrated, firms are still highly capable of overcoming those influencing factors that encourage adherence to established activity patterns and, as a result, are able to deviate from specific developmental paths.

In line with the philosophical perception of human nature applied in this dissertation – i.e., humans' ability to alter their behavior even within restrictive contextual situations (Emirbayer and Mische 1998) – this dissertation suggests an understanding of the concept

of path dependence in a less deterministic manner (Sydow et al. 2009). Despite the presence of stabilizing influencing factors, there remains scope for variation. This dissertation thus follows the argumentation of Garud and Karnøe (2001) and Djelic and Quack (2007) that agency matters in the concept of path dependence. That is,

> *entrepreneurs may intentionally deviate from existing artefacts and relevant structures, fully aware they may create inefficiencies in the present, but also aware that such steps are required to create new futures* (Garud and Karnøe 2001, p. 6).

7.2. THEORETICAL IMPLICATIONS AND CONTRIBUTIONS

In today's rapidly changing business environments, which are shaped by dynamism and uncertainty, one can frequently observe formerly successful companies failing to cope with and adapt to such changing circumstances. Voluntarily or involuntarily, consciously or unconsciously, these firms seem to follow a once entered path of development, which ultimately leads them down a dead-end road.

It has been argued that firms' endeavors to adapt often fail due to their inherent tendency to persist within processes of strategic change (Fainshmidt and Frazier 2017). Thereby, the literature has stressed that firms' development is subject to *"self-reinforcing"* mechanisms, which lead to automatized and stabilized activity patterns and thus inhibit organizational adaptation (Sydow et al. 2009; Schreyoegg and Sydow 2012).

However, even after 20 years of research on organizational path dependence, a clear understanding of the modes of action of those drivers of persistence is still missing (Sydow et al. 2009; Schreyoegg et al. 2011; Vergne and Durand 2010; Vergne 2013). In particular, previous literature has failed to provide empirical findings that explain how

self-reinforcing mechanisms develop and unfold within organizations, and how exactly they impede or prevent organizational adaptation (Vergne and Durand 2010; Vergne 2013).

While unpacking self-reinforcing mechanisms in practice (Sydow et al. 2009; Schreyoegg et al. 2011) and detecting the underlying components of the driving dynamics that keep organizations on a development path, this dissertation not only contributes to research on organizational path dependence, but also suggests a reconsideration of three elements of the concept of path dependence in general, and self-reinforcing mechanisms in particular: The level of analysis; the limiting effect on the scope of alternatives; and the influence of managerial agency.

First, previous literature has identified five distinct *"self-reinforcing"* mechanisms that establish organizational paths – scale, complementary, learning, coordination and expectation effects (Sydow et al. 2009; Schreyoegg et al. 2011; Apajalahti and Lovio 2012; Schreyoegg and Sydow 2012) – but these mostly remain at a superordinate level of analysis. However, to gain a profound understanding of how these effects impede organizational adaptation, a more detailed perspective regarding the underlying dynamics of self-reinforcing effects becomes necessary. Thus, this dissertation not only gets to the bottom of the dimensions of self-reinforcing effects that have only been briefly discussed in previous research (Sydow et al. 2009; Apajalahti and Lovio 2012; Schreyoegg and Sydow 2012), but also adds and discusses seven new dimensions of learning, coordination, and expectation effects. Thereby, this research advances understanding of self-reinforcing effects by providing in-depth explanations for their stabilizing effects.

Second, according to previous literature on path dependence, self-reinforcing effects initiate increasingly stabilized and automatized activity patterns that impel firms to adhere to their previously entered development paths (Sydow et al. 2009; Vergne and Durand 2011). Thus, it is argued that in the state of path dependence, scale, complementary, learning, coordination and expectation effects continuously narrow the range of alternatives available to firms, eventually leading them into a state of strategic lock-in (Sydow et al. 2009; Koch 2011).

Without restrictions, this dissertation empirically substantiates these theoretical assumptions with respect to the influence of scale and coordination effects. However, regarding complementary, learning and expectation effects, this dissertation disconfirms the notion of self-reinforcing effects exclusively having a limiting effect on the scope of alternatives. Even in a state of path dependence, complementary, learning and expectation effects have been found to also have a widening effect on the range of alternatives in certain dimensions and contextual settings. Thus, this dissertation contributes to an understanding of self-reinforcing mechanisms in two respects. On the one hand, the findings provide insights into how these effects influence organizational adaptation. On the other hand, this dissertation mitigates the deterministic character of self-reinforcing effects while demonstrating that they may also support firms in entering new development paths.

Third, whereas the existing literature suggests that in the state of path dependence, self-reinforcing mechanisms increasingly gain control and thus stabilize and automatize firms' activity patterns (Sydow et al. 2009; Schreyoegg and Sydow 2012), the empirical findings of this dissertation emphasize that the influence of scale, complementary,

learning, coordination and expectation effects in its different dimensions does not necessarily intensify over time. Hence, this dissertation challenges the notion of *"self-reinforcement"* and suggests a reconsideration of these dynamics as being temporal influencing factors on firms' decisions.

This absence of self-reinforcement consequently questions the deterministic character of the understanding of organizational path dependence (David 1985; Arthur 1989, 1990; Sydow et al. 2009; Schreyoegg and Sydow 2012). Indeed, whereas self-reinforcing mechanisms are conceptualized as working behind individual agents (Giddens 1984; Schreyoegg and Sydow 2012), increasingly and unnoticeably assuming control of firms' developmental processes, the findings presented here instead emphasize the influence of managerial agency (Garud and Karnøe 2001; Djelic and Quack 2007), even in a state of path dependence (Vergne and Durand 2011). It has been empirically shown that companies are quite capable of overcoming these influencing factors and subsequently breaking existing paths.

Accordingly, this dissertation not only provides evidence for the existence of the stabilizing forces denoted as *"self-reinforcing"* effects, but also furthers understanding of how these effects can be overcome. Thus, through investigating these mechanisms' modes of action, this dissertation goes beyond the mostly conceptual or meta-level research conducted to date (Vergne and Durand 2011; Vergne 2013). While providing empirical substantiation for a reconceptualization of the prevailing understanding of organizational path dependence and its driving dynamics, this dissertation follows the call of Vergne and Durand (2011) for further empirical observations of the path dependence phenomenon. Indeed, as Vergne (2013, p. 1194) has stated, "*organization and*

management scholars [so far] *have done a poor job at exploring path dependence empirically."*

The fact that some firms were able to overcome the stabilizing effects of scale, complementary, learning, coordination, and finally expectation effects indicates that the intensity of these mechanisms may vary across firms. Indeed, the argumentation of Den Hartigh and Langerak (2002), stressing that in practice, self-reinforcing effects may occur in combination and overlap, in turn potentially amplifying their effects as a driving force of organizational persistence, seems to be more appropriate than ever. The fact that the number of self-reinforcing effects that could be identified at Alpha, Beta, Gamma and Delta was significantly higher than the number of self-reinforcing effects identified at Epsilon and Zeta reinforces this proposition.

Moreover, this phenomenon might further indicate that these firms possess highly effective functions that allow them to perceive environmental changes and undertake the necessary alterations earlier than their competitors. That is what the literature refers to as dynamic capabilities (Teece et al. 1997; Eisenhardt and Martin 2000; Zollo and Winter 2002). Thereby, dynamic capabilities are conceptualized as an aggregate multi-dimensional construct that can be disaggregated into three distinct but related capacities (Teece 2018, 2007), none of which alone represents a dynamic capability (Barreto 2010). That is, *"strong dynamic capabilities will generally mean strong in all relevant areas of sensing, seizing, and transforming"* (Teece 2018, p. 43). Being weak at one specific capacity – potentially due to the impact of those temporal influencing factors denoted as *"self-reinforcing"* effects – precludes the company from taking the necessary steps toward organizational adaptation (Teece 2018). Thus, effective dynamic capabilities are

based on the interplay of three distinct capacities – sensing, seizing, and reconfiguring (Teece 2007; Teece and Leih 2016) – for which indications appeared in the cases of Epsilon and Zeta.

Both Epsilon and Zeta were able to perceive changes in market development, such as increasing uncertainties in the renewable energy sectors and the growing relevance of energy-related services, which might indicate the presence of a highly effective sensing capacity (Teece 2007). Both firms made timely and market-oriented decisions regarding the execution of market opportunities and threats – such as by choosing to terminate further investments in renewable energies – providing a strong indication of their seizing capacity (Teece 2007; Barreto 2010). Finally, Epsilon and Zeta successfully reallocated resources and capabilities to more future-oriented businesses and technologies in order to cope with market change, exemplifying their reconfiguring capacity (Teece 2007).

Thus, shedding further light on the influence of these micro-foundations of dynamic capabilities and particularly on their power to overcome the stabilizing dynamics of scale, complementary, learning, coordination and expectation effects may constitute a promising area for future research. In fact, both research streams – organizational path dependence and dynamic capabilities – may strongly benefit from combining these two perspectives on organizational persistence and organizational adaptation. This is particularly the case because the dynamic capability perspective places considerable importance on the influence of managerial agency in facilitating organization adaptation (Teece et al. 1997), which is also advocated with respect to future research on organizational path dependence.

7.3. MANAGERIAL IMPLICATIONS

More than ever, managers are compelled to make decisions under uncertainty and ambiguity. They face rapidly changing business environments in almost every industry, driven by frequent market disruption and competitive pressure from new market entrants, or what the literature defines as hypercompetition (D'Aveni 1995; Teece and Leih 2016). In particular, they must cope with changing consumer behaviors, technological changes that occur at increasingly shorter intervals, and shifting legal and political requirements that alter the business cases for their investments (Barreto 2010). In such environmental settings, continuous organizational adaptation is vital for long-term survival and success. However, as the examples of Nokia and Apple offered in the introduction of this dissertation as well as the cases studies of Alpha, Beta, Gamma, and Delta have all demonstrated, firms often tend to replicate formerly successful activity patterns and thereby adhere to a certain development path, a phenomenon that the literature describes as path dependence (Sydow et al. 2009; Schreyoegg et al. 2011; Schreyoegg and Sydow 2012). Thus, organizational adaptation becomes more and more difficult to implement.

To avoid such a development and to ensure that a firm remains amenable to adaptation, this dissertation particularly offers two critical implications for managers. First, this study has uncovered and analyzed the temporal influencing factors that impede organizational adaptation and keep firms on a once entered path. Indeed, this dissertation has visualized how these effects unfold their stabilizing character within different contextual settings. Previous research has only superficially dealt with these influencing factors and failed to discuss the underlying dynamics of their effects, that is, their dimensions and manifestations, hence managers' understandings of the notion of path dependence and the

drivers of this phenomenon have remained rather vague and elusive. The insights presented in this dissertation therefore provide concrete practical guidance for managers to increase their awareness of such stabilizing forces that narrow the range of alternative options within strategic decision making.

Thus, it can be observed for example that formalization and standardization (as one dimension of coordination effects) lead to efficiency gains by setting clear investment guidelines, and thereby only take into consideration investment opportunities that meet these criteria. On the other hand, this also means that opportunities beyond this spectrum, which might promise greater future potential and are strategically more important in the long term, are not taken into account. Consequently, future-oriented investments are continuously excluded, resulting in a lack of suitable alternatives in times of market change. At the same time, these *old* investments along the once entered path lead to problems that might be hard to reverse, especially with the resources available to the firm.

Accordingly, one key take-away from this research is that firms tend toward familiar businesses and technologies for which results are typically more stable, more certain and closer in time, than exploring new businesses and technologies. Thus, firms are often oriented toward efficiency while losing sight of effectiveness. This inherent proclivity is exacerbated by the influence of stabilizing forces that the literature defines as *"self-reinforcing"* mechanisms. Indeed, to be successful in the long term, managers must be aware of these influencing factors and be capable of overcoming them in order to balance both efficiency and effectiveness.

Second, this dissertation strongly suggests that even in a highly deterministic theory of path dependence, corporate managers matter. It has been argued that within a state of path dependence, stabilizing forces increasingly and unnoticeably assume control of firms' activity patterns. For managers, these forces are difficult to reverse, even when they are recognized.

However, in contrast to the prevailing theory of path dependence, the findings presented in this dissertation emphasize the influence of managers on the development path of companies. The case studies of Epsilon and Zeta in particular provide managers with concrete insights into how these stabilizing forces can be overcome and thus how continuous organizational adaptation can be achieved. One key point to be learned from Epsilon and Zeta is that the managers of these firms have constantly questioned previous decisions behind changing circumstances and have established the appropriate structures and processes to perceive environmental changes. Moreover, these two success stories illustrate that the two focal firms have continuously created new alternative options and have not been afraid to seize them, even if this meant abandoning their core business.

Figure 13 summarizes the most important success factors that have enabled the focal firms – in particular Epsilon and Zeta – to overcome these stabilizing forces. This list should be seen as a blueprint for managers, enabling organizational adaptation in order to cope with change. As these success factors have been extracted from the success stories of a single industry, their generalizability is inevitably limited. Nevertheless, the suggestions outlined above might still be substantive for managers in other industries, at least in certain ways.

Managers should …

1. Not only focus on achieving synergy potential with their investment decisions, but rather consider diversification concerns to prevent concentration risks.
2. Challenge previous investment decisions with respect to their future potentials.
3. Constantly search for new businesses and technologies (in adjacent areas), in which existing competencies can be applied.
4. Proactively challenge existing routines to avoid doing things, because they have been done in the past.
5. Consciously balance centralization versus decentralization, i.e., efficiency versus flexibility.
6. Scrutinize existing investment scenarios and its underlying assumptions, particularly behind the backdrop of changing environmental conditions.
7. Not consider assumptions as generally valid, but as being subjective measures.
8. Question existing investment criteria to avoid excluding future-oriented investment opportunities, because the do not meet those fixed criteria.
9. Pay attention to weak signals that might indicate changing environmental conditions, even thought they are only hardly qualitatively measurable.
10. Listen to new ideas and impulses without ideologically initiated prohibitions and encourage employees to report those.

Figure 13: Ten Key Success Factors for Organizational Adaptation

7.4. LIMITATIONS

Inevitably and despite its rich contributions to both literature and managerial practice, this dissertation has three limitations, related to the research design and the methodological approach chosen.

The first concern deals with a widespread critique and even a stereotyped view of many researchers stressing that case study research tends to lack the necessary rigor (Yin 2009), particularly with respect to validity (i.e., external validity, internal validity, and construct validity) and reliability (Gibbert and Ruigrok 2008). Thus, to ensure a rigorous case study approach, this dissertation applied a variety of measures (Eisenhardt 1991; Gibbert and

Ruigrok 2008). External validity means generalization, and given its very nature, case study research provides little basis for this (Gibbert and Ruigrok 2008; Yin 2009). However, this does not necessarily imply that case study research is entirely devoid of generalization (Gibbert and Ruigrok 2008). Thus, while case studies lack statistical generalization, i.e., they are not representative of a population (Eisenhardt and Graebner 2007), they may allow for analytical generalization, that is, generalization from empirical observations to theory (Gibbert and Ruigrok 2008; Yin 2009). Therefore, certain measures should be applied.

To ensure analytical generalization (external validity), this dissertation has followed the argumentation of Eisenhardt (1989) and Gibbert and Ruigrok (2008) suggesting a cross-case analysis of four to ten case studies as well as a clear rationale for case selection. In this dissertation, the case selection aimed to create a setting of focal firms that would enable considerable cross-case comparison. In particular, the focal firms in this research could be divided into three groups that are internally homogeneous and externally heterogeneous with respect to their initial resource equipment and development path. Thereby, the cases were sampled for theoretical reasons, that is, contrary replication of findings as well as theory advancement based on the emergent findings. Thus, the theoretical implications suggested in this dissertation can be regarded as analytically generalizable (Eisenhardt 1989; Gibbert and Ruigrok 2008).

While a multiple-case study *"typically yields more robust, generalizable, and testable theory than single-case research"* according to Eisenhardt and Graebner (2007, p. 27), the method has nevertheless been criticized for being too superficial and thereby missing the context of cases (Dyer and Wilkins 1991, p. 617). Additionally, opponents of this

approach frequently argue that multiple-case researchers tend to confirm versus disconfirm already existing theories while not letting analysis emerge over time (Dyer and Wilkins 1991, p. 617). To counter these arguments, this dissertation has provided a rich description of the context in which the focal firms' resource allocation and investment decisions took place. Moreover, this dissertation has clearly outlined how new dimensions of the theory of organizational path dependence emerged during case analysis.

To enhance internal validity, i.e., to provide plausible arguments and logical reasoning, this dissertation followed the suggestions of Eisenhardt (1989), Gibbert and Ruigrok (2008) and Yin (2009), that is, formulating and following a clear research framework, comparing empirically observed patterns among different contextual settings, and adopting multiple perspectives to verify findings.

To ensure construct validity in the process of data collection, this dissertation resorted to different data collection strategies and data sources (Denzin and Lincoln 2000; Gibbert and Ruigrok 2008; Yin 2009). In particular, the dissertation drew on archival data in the form of business and trade press articles and annual reports, and primary data gathered through interviews, in-depth discussions, and workshops with firm representatives with different hierarchical and functional backgrounds.

Finally, to ensure transparency and replication, or what the literature describes as reliability (Denzin and Lincoln 2000; Gibbert and Ruigrok 2008), this dissertation has provided a complete description of how the research was conducted, enabling replication

by future investigators, as all data collected were documented and organized within a case study database using the software NVivo 12 (Leonard-Barton 1990; Yin 2009).

A second limitation is related to the number of interviewees. Whereas the total time of interaction with the focal firms' representatives was high, one may still argue that the number of interviewees at each of the six focal firms was low. This may be a valid limitation in the context of a single in-depth case study. However, given that the methodology applied in this dissertation was a multiple-case approach, in which greater emphasis was placed on comparing replicated patterns among the focal firms than on an in-depth description of a single firm's actions (Eisenhardt 1989), the quantity of respondents was less important than the respondents' overview of the historic activity patterns of resource allocation in order to generate insightful findings.

Moreover, various types and sources of data were used to overcome the limitations of a relatively low number of interviewees and, as mentioned above, to ensure construct validity (Jick 1979; Denzin and Lincoln 2000; Gibbert and Ruigrok 2008; Yin 2009). Thus, firm-specific interviews and workshops with the C-level executives and middle managers of the focal firms were enriched by interviews with the C-level executives of other German utility companies, senior-level industry experts, and more than 2,500 pages of archival data containing business and trade press articles, annual reports, and internal documents such as decision proposals and memos.

A final limitation is related to the longitudinal research design, and in particular to the process of data collection. Given that the interviews and in-depth discussions were long-term retrospective, the methodology applied might be subject to potential critique with

respect to memory loss and retrospective rationalization (Danneels 2010). In order to mitigate the potential for retrospective response bias, this dissertation followed the recommended precautions of Huber and Power (1985). Thus, concerning the process of data collection, information from interviews was compared to that from other interviews, workshop notes, and contemporaneous secondary data to ensure data validity (Jick 1979). That is what the literature defines as triangulation (Eisenhardt 1989; Eisenhardt and Graebner 2007; Yin 2009). However, despite these potential weaknesses in terms of memory loss and retrospective bias, one could also argue that the time that had elapsed since the specific activities of the focal firms occurred, enabled the interviewees to be more open and transparent (Danneels 2010). Such behavior could be observed in various answers. For example, one former Manager, Internal Consulting of Beta admitted that *"we have procrastinated on the issue of the nuclear phase-out and have not really taken it seriously."* Moreover, he confessed:

> *All our previous strategies over the last five years were actually wrong. And this is not only my personal opinion, but that of the strategy head of Beta. He told me that actually none of what we thought was right.*

Indeed, the openness and the transparency of the interviewees more than compensated for the room for critique with respect to the respondents' memory loss and retrospective bias.

In conclusion, the author is confident that despite this dissertation's limitations, but mainly because of the mitigation strategies applied, the findings presented are of genuine theoretical and practical value.

8. CONCLUSION

Change before you have to.

Jack Welch

This dissertation has shed light on the role of self-reinforcing mechanisms, that is, the drivers behind organizational path dependence (Sydow et al. 2009; Schreyoegg and Sydow 2012), in impeding organizational adaptation. In order to unpack the self-reinforcing mechanisms in practice and to crystalize the components of these driving dynamics that keep organizations on a development path, a multiple-case study approach has been applied to investigate the particular development of six German utility companies in the time period between the liberalization of the German energy market in 1999, and 2015. Therefore, this research has followed strong calls from existing literature claiming that a clear understanding of the underlying driving forces of path dependence remains absent (Vergne and Durand 2010; Vergne 2013), and that the theory would greatly benefit from empirical substantiation (Vergne 2013), particularly through the use of multiple-case studies (Schreyoegg et al. 2011).

Twenty years since Sydow et al.'s (2009) seminal work, research on organizational path dependence has not progressed much further and many researchers are still somewhat skeptical of the theory (Vergne and Durand 2010; Vergne 2013). This is largely because the role of the manager has to date hardly been taken into account, whereas other theories – such as the dynamic capabilities perspective (Teece et al. 1997; Eisenhardt and Martin 2000; Helfat and Peteraf 2015), which emphasizes the importance of managerial agency

and its influence on corporate development – have received much more attention. In response, the findings presented in this dissertation help to bring the theory of path dependency back into scientific focus. On the one hand, the findings clearly show how companies stick to development paths, as well as the particular role played by *"self-reinforcing"* effects in this path-dependent behavior. On the other hand, this dissertation has made important contributions to a renewed understanding of the theory of organizational path dependence and its driving forces.

In particular, this dissertation has left the superordinate level through identifying and explaining the underlying dynamics of such stabilizing effects in order to increase understanding of how these mechanisms work. Thus, this dissertation has found that such stabilizing effects may also have a facilitating influence on organizational adaptation in certain contextual settings. Finally, this dissertation has highlighted the possibilities of corporate managers overcoming the stabilizing influences of *"self-reinforcing"* effects, even in a state of path dependence. In these ways, this dissertation has emphasized that path breaking is more than just a theoretical idea.

To become a grand theory, path dependence scholars are encouraged to focus on both theory-building and theory-testing studies (Eisenhardt 1989). To this end, this dissertation strongly suggests that future research on organizational path dependence additionally focus on quantitative reasoning, which to date has received very little attention (Vergne and Durand 2011; Vergne 2013). By crystallizing the underlying dynamics of these stabilizing forces and thus furthering their operationalization, the present dissertation provides an empirically tested framework for quantitative verification. Again, this would be an important step to further advance theory and increase its robustness and

defensibility (Miles and Huberman 1994; Creswell 2013), as there remains significant opposition to the theory of organizational path dependence, which due to the prevalent single-case study methodology, also offered much scope for attack. Therefore, the application of quantitative methods could increase the theory's generalizability and coincidently diminish the room for critique.

Consequently, future research is advised to apply the insights generated from this dissertation to different contextual settings. Indeed, industries with a high level of market dynamism may provide an appropriate empirical research setting. While the phenomenon of path dependence inherently implies a processual dimension (Sydow et al. 2009), research should apply a time-based perspective in order to verify the role and deepen the understanding of such stabilizing effects as driving forces of path dependence. Thus, longitudinal research designs are preferable over cross-sectional methods as they incorporate the dimension of time and generate powerful insights.

The author of this dissertation hopes that the novel insights presented here will encourage scholars to further explore the theory of organizational path dependence and the role of the stabilizing forces identified on organizational adaptation, in order to further enhance understanding of organizational path dependence, to increase the theory's acceptance in the scholarly community, and finally to establish a more holistic theory. Thus, the author trusts and is confident that the suggested reconsiderations of the theory of organizational path dependence, especially with respect to its deterministic character, will increase the proportion of scholars supporting the path dependence story.

REFERENCE LIST

ANDERSON, P., MEYER, A., EISENHARDT, K.M., CARLEY, K. and PETTIGREW, A., 1999. Introduction to the special issue: applications of complexity theory to organization science. *Organization Science*. vol. 10, pp. 233-236.

APAJALAHTI, E.-L. and LOVIO, R., 2012. Destabilisation of self-reinforcing mechanisms: the case of carbon lock-in in a large energy company. *28th EGOS Colloquium*. Helsinki: EGOS Colloquium.

ARGOTE, L., 1999. *Organizational learning: creating, retaining and transferring knowledge.* Boston: Kluwer Academic.

ARTHUR, W.B., 1989. Competing technologies, increasing returns, and lock-in by historical events. *The Economic Journal.* vol. 99, pp. 116-131.

ARTHUR, W.B., 1990. Positive feedback in the economy. *Scientific American.* vol. 262, pp. 92-99.

BARRETO, I., 2010. Dynamic capabilities: a review of past research and an agenda for the future. *Journal of Management.* vol. 36, pp. 256-280.

BAUM, J.A.C., LI, S.X. and USHER, J.M., 2000. Making the next move: how experiential and vicarious learning shape the locations of chains' acquisitions. *Administrative Science Quarterly.* vol. 45, pp. 766-801.

BLUMER, H., 1969. *Symbolic interactionism: perspective and method.* Englewood Cliffs: Prentice Hall.

BROCKNER, J., 1992. The escalation of commitment to a failing course of action: toward theoretical progress. *Academy of Management Review.* vol. 17, pp. 39-61.

BURRELL, G. and MORGAN, G., 1979. *Sociological paradigms and organisational analysis: elements of the sociology of corporate life.* London: Pearson Education.

CRESWELL, J.W., 2013. *Research design: qualitative, quantitative, and mixed methods.* Thousand Oaks: Sage Publications.

CRESWELL, J.W. and Clark, V.L.P., 2007. *Designing and conducting mixed methods research.* Thousand Oaks: Sage Publications.

GRUBER, M., 2010. Exploring the Origins of Organizational Paths: empirical Evidence From Newly Founded Firms. *Journal of Management*, vol. 36, pp. 1143-1167.

D'AVENI, R.A., 1995. Coping with hypercompetition: utilizing the new 7S's framework. *Academy of Management Executive*. vol. 9, pp. 45-57.

DANNEELS, E., 2002. The dynamics of product innovation and firm competences. *Strategic Management Journa.* vol. 23, pp. 1095-1121.

DANNEELS, E., 2010. Trying to become a different type of company: dynamic capability at Smith Corona. *Strategic Management Journal*. vol. 32, pp. 1-31.

DAVID, P.A., 1985. Clio and the economics of QWERTY. *The American Economic Review*. vol. 75, pp. 332-337.

DEN HARTIGH, E. and LANGERAK, F., 2002. Monitoring self-reinforcing mechanisms: the case of Randstad Group. *European Management Journal.* vol. 20, pp. 495-504.

DENZIN, N.K. and LINCOLN, Y.S., 2000. *Handbook of qualitative research*. 2nd ed. Thousand Oaks: SAGE Publications.

DJELIC, M.-L. and QUACK, S., 2007. Overcoming path dependency: path generation in open systems. *Theory and Society.* vol. 36, pp. 161-186.

DOUGLAS, J.D., 1970. *Understanding everyday life.* Chicago: Aldine Publishing.

DRUCKMAN, D., 2005. *Doing research.* Thousand Oaks: Sage Publications.

DYER, W.G.J. and WILKINS, A.L., 1991. Better stories, not better constructs, to generate better theory: a rejoinder to Eisenhardt. *Academy of Management Review.* vol. 16, pp. 613-619.

EDMONDSON, A.C. and MCMANUS, S.E., 2007. Methodological fit in management field research. *Academy of Management Review.* vol. 32, pp. 1155-1179.

EISENHARDT, K.M., 1989. Building theories from case study research. *Academy of Management Review*. vol. 14, pp. 532-550.

EISENHARDT, K.M., 1991. Better stories and better constructs: the case for rigour and comparative logic. *Academy of Management Review.* vol. 16, pp. 620-627.

EISENHARDT, K.M. and GRAEBNER, M.E., 2007. Theory building from cases: opportunities and challenges. *Academy of Management Journal.* vol. 50, pp. 25-32.

EISENHARDT, K.M. and MARTIN, J.A., 2000. Dynamic capabilities: what are they? *Strategic Management Journal.* vol. 21, pp. 1105-1121.

EMIRBAYER, M. and MISCHE, A., 1998. What is agency? *American Journal of Sociology.* vol. 103, pp. 962-1023.

ESSER, J.K., 1998. Alive and well after 25 years: a review of groupthink research. *Organizational Behavior and Human Decision Processes.* vol. 73, pp. 116-141.

FAINSHMIDT, S. and FRAZIER, M.L., 2017. What facilitates dynamic capabilities? The role of organizational climate for trust. *Long Range Planning.* vol. 50, pp. 550-566.

GARUD, R. and KARNØE, P., 2001. Path creation as a process of mindful deviation, In: R. GARUD and P. KARNØE, eds. *Path dependence and creation.* Mahwah: Lawrence Erlbaum Associates, pp. 1-38.

GEPHART, R.P., 2004. Qualitative research and the Academy of Management Journal. *Academy of Management Journal.* vol. 47, pp. 454-462.

GHEMAWAT, P., 1991. *Commitment: the dynamics of strategy.* New York: Free Press.

GIBBERT, M. and RUIGROK, W., 2008. What passes as a rigorous case study? *Strategic Management Journal.* vol. 29, pp. 1465-1474.

GIDDENS, A., 1974. *Positivism and sociology.* London: Heinemann.

GIDDENS, A., 1984. *The constitution of society: outline of the theory of structure.* Berkeley: University of California Press.

GILBERT, C.G., 2005. Unbundling the structure of inertia: resources versus routine rigidity. *Academy of Management Journal.* vol. 48, pp. 741-763.

GULER, I., 2007. Throwing good money after bad? Political and institutional influences on sequential decision making in the venture capital industry. *Administrative Science Quarterly.* vol. 52, pp. 248-285.

HALLER, H.B. and NORPOTH, H., 1994. Let the good times roll: the economic expectations of U.S. voters. *American Journal of Political Science.* vol. 38, pp. 183-207.

HANNAN, M.T. and FREEMAN, J., 1984. Structural inertia and organizational change. *Americal Sociological Review.* vol. 49, pp. 149-164.

HARRELD, J.B., O'REILLY, C.A. and TUSHMAN, M.L., 2006. Dynamic capabilities at IBM: driving strategy into action. *California Management Review*. vol. 49, pp. 21-43.

HE, Z.-L. and WONG, P.-K., 2004. Exploration vs. exploitation: an empirical test of the ambidexterity hypothesis. *Organization Science.* vol. 15, pp. 481-494.

HELFAT, C.E. and PETERAF, M.A., 2015. Managerial cognition capabilities and the microfoundations of dynamic capabilities. *Strategic Management Journal*. vol. 36, pp. 831-850.

HUBER, G.P. and POWER, D.J., 1985. Retrospective reports of strategic-level managers: guidelines for increasing their accuracy. *Strategic Management Journal.* vol. 6, pp. 171-180.

HUFF, J.O., HUFF, A.S. and THOMAS, H., 1992. Strategic renewal and the interaction of cumulative stress and inertia. *Strategic Management Journal.* vol. 13, pp. 55-75.

JANIS, I.L., 1971. Groupthink. *Psychology Today.* vol. 5, pp. 84-90.

JANIS, I.L., 1972. *Victims of groupthink: a psychological study of policy decisions and fiascos.* Boston: Houghton-Mifflin.

JICK, T.D., 1979. Mixing qualitative and quantitative methods: triangulation in action. *Administrative Science Quarterly.* vol. 24, pp. 602-611.

JOHNSON, P. and JOHNSON, G., 2002. Facilitating group cognitive mapping of core competencies. In: A.S. HUFF and M. JENKINS, eds. *Mapping strategic knowledge*. London: SAGE Publications, pp. 220-236.

JOHNSON, V., 2007. What is organizational imprinting? Cultural entrepreneurship in the founding of the Paris Opera. *American Journal of Sociology.* vol. 113, pp. 97-127.

KAPLAN, S. and HENDERSON, R., 2005. Inertia and incentives: bridging organizational economics and organizational theory. *Organization Science.* vol. 16, pp. 509-521.

KEAT, R. and URRY, J., 1975. *Social theory as science.* London: Routledge.

KOCH, J., 2011. Inscribed strategies: exploring the organizational nature of strategic lock-in. *Organization Studies.* vol. 32, pp. 337-363.

KOLAKOWSKI, L., 1972. *Positivist philosophy: from Hume to the Vienna Circle.* Harmondsworth: Penguin Books Ltd.

LEIBENSTEIN, H., 1950. Bandwagon, snob, and Veblen effects in the theory of consumers' demand. *The Quarterly Journal of Economics.* vol. 64, pp. 183-207.

LEONARD-BARTON, D., 1990. A dual methodology for case studies: synergistic use of a longitudinal single site with replicated multi sites. *Organization Science.* vol. 1, pp. 248-266.

LEVINTHAL, D.A. and MARCH, J.G., 1993. The myopia of learning. *Strategic Management Journal.* vol. 14, pp. 95-112.

LEVITT, B. and MARCH, J.G., 1988. Organizational learning. *Annual Review of Sociology.* vol. 14, pp. 319-340.

LUHMANN, N., 2012. *Soziale systeme: grundriss einer allgemeinen theorie.* Frankfurt am Main: Surhkamp.

MARCH, J.G., 1991. Exploration and exploitation in organizational learning. *Organization Science.* vol. 2, pp. 71-87.

MARCH, J.G. and SIMON, H.A., 1958. *Organizations*. New York: John Wiley and Sons.

MARKIDES, C., 1998. Strategic innovation in established companies. *Sloan Management Review*. vol. 39, pp. 31-42.

MARTINEZ, J.I. and JARILLO, J.C., 1989. The evolution of research on coordination mechanisms in multinational corporations. *Journal of International Business Studies.* vol. 20, pp. 489-514.

MILES, M.B. and HUBERMAN, A.M., 1994. *Qualitative data analysis: an expanded sourcebook.* Thousand Oaks: Sage Publications.

MONTANARI, J.R. and MOORHEAD, G., 1989. Development of the groupthink assessment inventory. *Educational and Psychological Measurement.* vol. 49, pp. 209-219.

MOORHEAD, G., and MONTANARI, J.R., 1986. An empirical investigation of the groupthink phenomenon. *Human Relations.* vol. 39, pp. 399-410.

O'REILLY, C.A., 1989. Corporations, culture, and commitment: motivation and social control in organizations. *California Management Review.* vol. 31, pp. 9-25.

O'REILLY, C.A. and CHATMAN, J.A., 1996. Culture as social control: corporations, cults, and commitment. In: B.M. STAW and L.L. CUMMINGS, eds. *Research in organizational behavior: an annual series of analytical essays and critical reviews.* Stamford: JAI Press, pp. 157-200.

PANZAR, J.C. and WILLIG, R.D., 1977. Economies of scale in multi-output production. *Quarterly Journal of Economics.* vol. 91, pp. 481-493.

PANZAR, J.C. and WILLIG, R.D., 1981. Economies of scope. *American Economic Review.* vol. 71, pp. 268-272.

PARK, W.-W., 1990. A review of research on groupthink. *Journal of Behavioral Decision Making.* vol. 3, pp. 229-245.

PEHRSSON, A., 2006. Business relatedness and performance: a study of managerial perceptions. *Strategic Management Journal.* vol. 27, pp. 265-282.

PIERSON, P., 2000. Increasing returns, path dependence, and the study of politics. *American Political Science Review.* vol. 94, pp. 251-267.

PRAHALAD, C.K. and HAMEL, G., 1990. The core competence of corporation. *Harvard Business Review.* vol. 68, pp. 79-91.

PUGH, D.S., HICKSON, D.J., HININGS, C.R. and TURNER, C., 1968. Dimensions of organization structure. *Administrative Science Quarterly*. vol. 13, pp. 65-105.

RAISCH, S. and BIRKINSHAW, J., 2008. Organizational ambidexterity: antecedents, outcomes, and moderators. *Journal of Management.* vol. 34, pp. 375-409.

RAISCH, S., BIRKINSHAW, J., PROBST, G. and TUSHMAN, M.L., 2009. Organizational ambidexterity: balancing exploitation and exploration for sustained performance. *Organization Science.* vol. 20, pp. 685-695.

ROSS, J. and STAW, B.M., 1993. Organizational escalation and exit: lessons from the Shoreham Nuclear Power Plant. *Academy of Management Journal.* vol. 36, pp. 701-732.

RUMELT, R.P., 1982. Diversification strategy and profitability. *Journal of Industrial Economics.* vol. 3, pp. 359-369.

SCHREYOEGG, G. and KLIESCH-EBERL, M., 2007. How dynamic can organizational capabilities be? Towards a dual-process model of capability dynamization. *Strategic Management Journal.* vol. 28, pp. 913-933.

SCHREYOEGG, G. and SYDOW, J., 2012. The power of self-reinforcing processes in and among organizations: introduction. *28th EGOS Colloquium*. Helsinki: EGOS Colloquium.

SCHREYOEGG, G., SYDOW, J. and HOLTMANN, P., 2011. How history matters in organisations: the case of path dependence. *Management & Organizational History.* vol. 6, pp. 81-100.

SCHWARZ, G.M., 2010. The logic of deliberate structural inertia. *Journal of Management.* vol. 38, pp. 547-572.

STAW, B.M., 1976. Knee-deep in the Big Muddy: a study of escalating commitment to a chosen course of action. *Organizational Behavior and Human Performance.* vol. 16, pp. 27-44.

STIMPERT, J.L. and DUHAIME, I.M., 1997. In the eyes of the beholder: conceptualizations of relatedness held by the managers of large diversified firms. *Strategic Management Journal.* vol. 18, pp. 111-125.

STINCHCOMBE, A.L., 1965. Social structures and organizations, in: J.G. MARCH, ed. *Handbook of organizations.* Chicago: Rand McNally, pp. 142-193.

STRAUSS, A.L., 1985. *Qualitative analysis for social sciences*. New York: Cambridge University Press.

SYDOW, J., SCHREYOEGG, G. and KOCH, J., 2009. Organizational path dependence: opening the black box. *Academy of Management Review*. vol. 34, pp. 689-709.

SYDOW, J., WINDELER, A., SCHUBERT, C. and MOLLERING, G., 2012. Organizing R&D consortia for path creation and extension: the case of semiconductor manufacturing technologies. *Organization Studies*. vol. 33, pp. 907-936.

TEECE, D.J., 2007. Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance. *Strategic Management Journal.* vol. 28, pp. 1319-1350.

TEECE, D.J., 2012. Dynamic capabilities: routines versus entrepreneurial action. Journal of Management Studies. vol. 49, pp. 1395-1401.

TEECE, D.J., 2018. Business models and dynamic capabilities. *Long Range Planning.* vol. 51, pp. 40-49.

TEECE, D.J. and LEIH, S., 2016. Uncertainty, innovation, and dynamic capabilities: an introduction. *California Management Review.* vol. 58, pp. 5-12.

TEECE, D.J., PETERAF, M.A. and LEIH, S., 2016. Dynamic capabilities and organizational agility: risk, uncertainty, and strategy in the innovation economy. *California Management Review.* vol. 58, pp. 13-35.

TEECE, D.J., PISANO, G. and SHUEN, A., 1997. Dynamic capabilities and strategic management. *Strategic Management Journal.* vol. 18, pp. 509-533.

VAN MAANEN, J., 1998. *Qualitative studies of organizations.* Thousand Oaks: Sage Publications.

VERGNE, J.-P., 2013. QWERTY is dead; long live path dependence. *Research Policy.* vol. 42, pp. 1191-1194.

VERGNE, J.-P. and DEPEYRE, C., 2016. How do firms adapt? A fuzzy-set analysis of the role of cognition and capabilities in U.S. defense firms' responses to 9/11. *Academy of Management Journal.* vol. 59, pp. 1653-1680.

VERGNE, J.-P. and DURAND, R., 2010. The missing link between the theory and empirics of path dependence: conceptual clarification, testability issue, and methodological implications. *Journal of Management Studies.* vol. 47, pp. 736-759.

VERGNE, J.-P. and DURAND, R., 2011. The path of most per*sistence: an evolutionary perspective on path dependence and dynamic capabilities. Organization Studies.* vol. 32, pp. 365-382.

WOLF, C. and FLOYD, S.W., 2017. Strategic planning research: toward a theory-driven agenda. *Journal of Management.* vol. 43, pp. 1754-1788.

YAN, A. and GRAY, B., 1994. Bargaining power, management control, and performance in United States–China joint centures: a comparative case study. *Academy of Management Journal.* vol. 37, pp. 1478-1517.

YIN, R.K., 2009. *Case study research: design and methods*, 5th ed. Thousand Oaks: Sage Publications.

ZOLLO, M. and WINTER, S.G., 2002. Deliberate learning and the evolution of dynamic capabilities. *Organization Science.* vol. 13, pp. 339-351.

APPENDICES

Appendix 1: Interview Guideline

Interview Guideline

UNDERSTANDING THE GERMAN ENERGY SUPPLY MARKET:
MARKET MECHANISMS & MARKET PARTICIPANTS' BEHAVIOR

– MARKET PERSPECTIVE –

1. KEY MARKET CHARACTERISTICS

a. Please characterize and define the energy market.
b. Since its liberalization, what were the key changes in the market to which market players had to respond and (re-)align themselves?
c. What were the key drivers of change?
   - *Politics (defining the direction of development through energy focus and competition accelerating or inhibiting decisions/ sanctions)*
   - *Importance of external influences (e.g. climate change, sensitization of consumers)*
   - *Innovations of competitors/ new market players*

2. SUCCESSFUL MARKET PARTICIPANTS

a. How did successful market players respond to market changes? What were the key success factors?
b. How to define success in this sense? How to measure success?
c. What were these market players' (corporate) strategies?
   - *E.g. establishing new innovative companies in the field of renewable energies, divestitures in non-core business units/ businesses*
d. What is the role of technological competences and capabilities?

3. PRECONDITIONS

a. Can it be assumed that market players entered the liberalized market/ competition with 'equal' preconditions in terms of resource endowments, access to resources, size etc.?
b. Were there milestones inhibiting the development of individual market players to a certain/ particular degree?
c. Conversely, were there factors (e.g. particular assets) putting individual market players into a superior starting position?

4. COMPANY TYPES

a. How do the discussed issues (response to market changes, success factors, corporate strategies, preconditions and inhibiting versus promoting factors) differ with respect to different company types?
b. What are the key distinguishing factors between company types (e.g. size, age, energy mix, value-added steps)?

5. DEVELOPMENTAL PHASES

a. Do you agree with our understanding of the market development in terms of key events and the breakdown into five developmental phases?
b. If not, how would you break down the market development? What were the key developmental events?

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Appendix 1: Interview Guideline *(continued)*

Interview Guideline

– ORGANIZATIONAL PERSPECTIVE –

6. RESOURCES

a. What are the key resources in the market/ for market players?
   - *E.g. tangible assets (financial resources, properties, power plants) intangible assets (human capital, capabilities, knowledge, structures, systems, corporate culture, technologies, technological competences and capabilities)*

7. RESOURCE ALLOCATION

a. How are resources allocated?
   - *E.g. markets, value-added steps, technologies, business units (distinction of business units by technologies for example)*
b. What meaning does resource allocation play for corporate success?
c. How dynamic is the process of resource (re-)allocation? Is there a constant questioning and adaptation of decisions/ actions?

8. PROCESSES OF RESOURCE ALLOCATION

a. Are there clear processes of resource allocation between business units, technologies, markets, functions etc.?
b. What practices, tools, techniques promote the allocation of resources?
c. What steps and key activities does the process of resource allocation encompass?
   - *Reconsidering and challenging existing resource allocations*
   - *Searching for/ identifying market opportunities and threats*
   - *Re-evaluating existing resource allocations in the light of changing market conditions and requirements*
   - *Evaluating and balancing market opportunities and threats*
   - *Deciding for (re-)allocating resources in a timely and market-oriented manner*
   - *(Re-)allocation of resources to new and sustainable businesses/ technologies*
   - *Divestitures in non-conventional energy divisions, non-core business units/ businesses, or established businesses in order to free up tied resources to be (re-)allocated to future businesses/ technologies*
   - *Acquisition of external resources to support the development of future businesses/ technologies*

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Appendix 1: Interview Guideline *(continued)*

9. OBSTACLES OF RESOURCE (RE-)ALLOCATION

a. What factors/ forces delimitate/ counteract the (re-)allocation of resources?
   - *What for example impedes the allocation of resources to new, future-oriented businesses/ technologies?*

b. Are there effects/ mechanisms that repeatedly confirm/ reproduce/ rigidify the existing allocation of resources and thereby, making the (re-)allocation of resources increasingly unattractive?
   i. To what extend did scale effects influence the resource (re-)allocation?
      - *Economies of scale (e.g. through capacity expansion of existing power plants to decrease the average costs per unit)*
      - *Economies of scope (e.g. through expansion of natural gas production capacities for own gas power plants)*
   ii. To what extend did complementary effects influence the resource (re-)allocation?
      - *Growth opportunities in complementary/ adjacent businesses (e.g. energy-related services business)*
      - *Shared resources (e.g. skills, competencies, customers)*
   iii. To what extend did learning effects influence the resource (re-)allocation?
      - *Efficiency improvements (e.g. improvement of fuel utilization in coal power generation; reduction of emissions from coal/ gas power generation)*
      - *Exploitation of existing businesses/ technologies (e.g. focusing on conventional energy generation because of existing core competencies)*
   iv. To what extend did coordination effects influence the resource (re-)allocation?
      - *Centralization (e.g. centralization of energy generation businesses)*
      - *Formalization/ standardization (e.g. written investment policies)*
      - *Planning, budgeting, and goal setting (e.g. making assumptions for preparing business cases)*
   v. To what extend did expectation effects influence the resource (re-)allocation?
      - *Social expectations (e.g. expectations of population with respect to nuclear power plants)*
      - *Social belonging and being on the winning side (e.g. following others' in establishing renewable energies)*
      - *Informal/ unwritten norms (e.g. generally accepted norms)*
      - *Legitimacy for decisions (e.g. acceptance of decisions)*

c. How can these effects be overcome? Are there any examples how these effects have been overcome?